DOCUMENT RESUME

ED 413 448 CE 075 047

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|---|---|
| AUTHOR | Roche, Ken; Cummings, Judy |
| TITLE | Measuring Up: A Guide To Developing Integrated Learning Programs for Vocational-Technical Students. |
| INSTITUTION | Franklin County Technical School, Turners Falls, MA. |
| SPONS AGENCY | Massachusetts State Dept. of Education, Boston. |
| PUB DATE | 1993-10-00 |
| NOTE | 130p.; Appendix 7, products catalog of the National Center for Research in Vocational Education, is not included. Also produced by the AVIP Teaching Team. |
| PUB TYPE | Guides - Non-Classroom (055) |
| EDRS PRICE | MF01/PC06 Plus Postage. |
| DESCRIPTORS | *Academic Education; *Articulation (Education); Career Choice; Carpentry; Classroom Techniques; Cooperative Planning; *Curriculum Development; Educational Cooperation; Employment Qualifications; Grants; Inservice Teacher Education; *Integrated Curriculum; Job Skills; Mathematics Skills; Outreach Programs; Pilot Projects; Program Development; Questionnaires; Resource Materials; Rural Areas; Rural Education; Secondary Education; *Vocational Education |

ABSTRACT

This guide, which is intended for vocational teachers interested in integrating vocational and academic instruction, documents and discusses the processes involved in the development of the Academic Vocational Integration Project (AVIP) at Franklin County Technical School (FCTS), which is located in a rural Massachusetts county with a large special needs population. The introduction examines the need to integrate academic and vocational education and discusses the problem of curriculum integration from teachers' and students' viewpoints. The following are among the topics discussed in the guide's remaining three sections: integrating the curriculum and teaching strategies (developing integrated curricula, recognizing authentically integrated curricula, incorporating generalized learning into shop situations, developing learning and employability skills, clustering closely related shops for math and language classes, providing special needs help in ships, sharing teaching techniques, assessing and evaluating student progress, teaching in teams, training teachers, using computers); development, implementation, and effectiveness of the AVIP; and grant activities (outreach activities, developments within FCTS). Appendixes constituting approximately 50% of this document contain the following: basic technical skills shop survey; careers choices curriculum; shop math materials; unified carpentry-related curriculum; list of Massachusetts Vocational Curriculum Resource Center integration resources; and miscellaneous materials. (MN)

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# Measuring Up:

# A Guide to Developing Integrated Learning Programs for Vocational-Technical Students

**Project:**
**Integration of Academic and Vocational Technical Education:**
**Strategies for Success**

**Developed for:**
**The Massachusetts Department of Education**
**Malden, MA**

**October, 1993**

U.S. DEPARTMENT OF EDUCATION
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**by**
**Ken Rocke**
**Judy Cummings**
***and***
**The AVIP Teaching Team**
**at**
**Franklin County Technical School**
**Turners Falls, MA 01376**

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## Acknowledgments

We, the authors of this manual, wish to acknowledge the following persons who have helped us in various ways during the development of the AVIP program, in the progress of this grant, and in the writing of this manual. It must be noted that some of these persons served in more than one capacity, although they may be acknowledged only once. We are indebted to each and every person who has offered help, encouragement, and advice to us. Without their input, the project and the manual would not have been as successful. Thank you.

**Our Carpentry and Plant Maintenance Students at Franklin County Technical School**

**David Filkins** - Former Superintendent Director of Franklin County Technical School.

**Walter Welch** - Superintendent Director of Franklin County Technical School.

**Patricia Bassett** - Assistant Superintendent of Franklin County Technical School.

**Robert Morey** - Coordinator of Academic and Vocational Teachers

**Marilee Greene** - Coordinator of Special Education

**Peter LaFrance** - Coordinator of Grant Activities

Members of the AVIP team
**Rick Lane** - Math Teacher
**Jill Freitas** - English Teacher
**Jim Klaiber** - Science Teacher
**Guy LaPollo** - Plant Maintenance Teacher

Faculty members of Franklin County Technical School involved in the Shop Math Program, Development of the Career Choices Curriculum, and the Shop Interviews.
**Barbara Rubin**
**Joanne Fournier**
**Lois Bean**
**Linda Tulenko**
**Chester Chin**
**Bill Kerivan**
**Tom Specht**
**Francis Burnett**
**Anna Steele**
**Jason Boron**
**Marty Glaser**
**Dan Morgan**

Members of the Advisory Committee - representing business and the community
**Jay Lord** - North East Foundation for Children
**Wayne Shepherd** - Merrilatt Industries
**Art Schwenger** - Franklin/Hampshire Employment Consortium
**Bill Cummings** - Rule Cutting Tool

**Daryl Briten** - for helping in the editing of this manual

**Dr. Ron Fitzgerald** - Superintendent Director of Minuteman Technical School

**Dr. Mike Fitzpatrick** - Fitchburg State College

**John McDonagh** - Formerly with the Massachusetts Department of Occupational Education
Currently Director of the Massachusetts Vocational Curriculum Resource Center.

**Maryellen McDonagh** and **Stafford Peat** - Massachusetts Department of Education

Our 'sister teams' at **Greater Lowell Vocational Technical High School** and **Somerville High School**

We also wish to acknowledge our Advisory Committee:

David Filkins
Former Superintendent Director of Franklin County Technical School

Marilee Greene
Coordinator of Pupil Personnel Services
FCTS

Sharon Dzialo
Guidance Counselor
FCTS

Robert Morey
Coordinator of Academic and Vocational Education
FCTS

Jay Lord
North East Foundation for Children
Montague City Road
Greenfield, MA 01301

Wayne Shepherd
Personnel Manager
Merillat Industries
Whately, MA

Arthur Schwenger
Franklin/Hampshire Employment and Training Consortium
1 Arch Place
Greenfield, MA 01301

William Cummings
Production Manager
Rule Cutting Tool
Industrial Park
South Deerfield, MA 01303

This manual was produced under a $25,000. contract from the Massachusetts Department of Education given to Franklin County Technical School. Contents of this manual reflect only the opinions of project staff members, and should not be taken as policy of the D.O.E.

# INTRODUCTION

# Introduction

Much is being asked of teachers in vocational schools these days. Our primary job has always been to train voc-tech students for entry-level jobs in skilled occupations. We are now being asked to also teach our students how to learn, and how to develop critical thinking skills. We are told that our graduates must be prepared to be 'lifelong learners', ready to change with changing times and advancing technologies. We are reminded that semi-skilled jobs are decreasing in number, and that most if not all skilled jobs of the future will require basic computer skills. And we are warned that if the United States is to remain competitive in the international marketplace, we need a new and more highly skilled worker. We have a new mission to go with our old one. We are told we must produce 'doers' who are also thinkers. It all sounds very good on paper, but the question is - can we do it? Is it even possible?

There seems to be some confusion among educational reformers regarding how to make all of this happen and which to emphasize, occupational skills or generalized learning. The competency-based voc-ed movement emphasizes occupational skills, in which all tasks, jobs, and duties required for the job are defined. However what is required on the job today may not be what will be needed tomorrow. The 'generalists' see this and want to insure our that students understand theory first, and develop skills second. They like to quote industry leaders who say 'send us someone who can think, and we will train them.'

However, this philosophy seems to apply to executive and managerial positions only. In today's world of production, construction, and service, thinking is not enough. Entry-level occupational skills are almost a necessity for landing a job with a future. On the other hand, generalized problem-solving and learning skills are the key to career advancement and job mobility, and seem to be the only security blanket in an increasingly uncertain economic situation.

Can we do both? Perhaps. One problem is that most of our schools have been set up to provide either college-prep or vocational training. Nowhere is this more evident than in our vocational secondary schools. Academics and shops run side by side, on parallel courses, rarely, if ever making connections. Academic and vocational teachers are trained differently, teach differently, work in different kinds of environments, and sometimes, we suspect, think differently. It is no surprise that most academic teachers think that the skills they are teaching, and the way they are teaching them, are the most important ones for their students. Vocational teachers' opinions are equally predictable. Administrators are generally more willing to acknowledge the merits, even the need for 'integration', but are themselves severely bound by the budgets of staff time and payroll which they must manage.

What can be done to bring about change? Although it is true that teachers fall into different camps in their thinking, it is also true that most are willing, and even eager to learn and adopt new and effective teaching techniques - if they are given adequate time for the task. Most teachers are not provided with the time to talk to and coordinate with other teachers.

What effect does all of this have upon our students? At present, our teaching methods are dis-integrated, broken up, falsely and harmfully divided within our schools. Students are the victims, educators the unwitting agents. A learning process which should be natural, connected and understandable to most students has been broken down into so many little and disconnected pieces that our students go around wondering - "What is all this for?"

This manual is the result of two years of experimentation with a certain model for integrating academic and vocational instruction within our school. When the state RFP for this grant came out, and we responded with our proposal, the only part of their request that we hesitated about was their provision that strategies be 'no-cost, low-cost' solutions to the problem of re-integrating voc-tech education. We have struggled with that part of it, as we have struggled with very real budget constraints within our own program. In our case, we designed a program and were fortunate to be able to implement part of it and unfortunate in not being able to implement the rest. We were able to implement the courses we designed. We were not provided the curriculum design and development time we thought essential to the project.

After two years of work on this model, we think we have learned two things about cost-effectiveness: **Integration works and it is not cheap**. There is a great time investment required during the development period. If it is not budgeted for, it will be squeezed out of the '*work time*' of those teachers involved, for we have yet to meet a good teacher who has any '*free*' time.

The cost cannot always be measured in additional positions, money for curriculum, conferences, etc. Where time can be found within existing teacher schedules to allow for brainstorming, group planning, and development of new curriculum for integrated courses, then the cost appears to be low. If such isn't found, and if budget constrains prohibit paid hours of development time, then the dollar cost can be low, but the program will be ineffective. The worst possible result comes about when a good idea is mandated, and then forced to survive without adequate resources. We have seen this time and time again in the world of education. The idea survives, but only as a shell. The desired effect does not come about. The idea is declared a failure, the attempt at reform abandoned. We do not want to see this happen to the integration 'movement'.

Teachers, as a whole, are suspicious of change, especially when it comes down from above and seems to be nothing but a new flock of 'buzzwords'. Their caution has some basis in their experience and cannot be treated lightly. Within a community of teachers, reform movements perhaps get one good shot. If they are intelligently conceived, educationally sound, and are carried out in a fair manner, they have some chance of success. If, through arrogance, ignorance, or some other flaw, these movements flounder at the beginning, they may never be tried again.

One of the presenters by whom we were inspired confided in us that he no longer will present to groups of teachers if he does not feel that the administration is ready to support change within the building. "They get all excited about new possibilities within teaching, and when they are unable to carry out their dreams, they become so frustrated that the whole effort is self-defeating in the end."

Integration is not easy. It is not cheap. It involves profound change at every level. The people involved need a lot of time to try it out. Integration is a teaching strategy with unlimited potential.

## What is this manual ?

This manual is one of three being produced under identical grants from the Mass. State Dept. of Education. The other manuals are being produced by Somerville High School and Greater Lowell Voc-Tech Regional.

The three schools differ in many ways: Somerville and Lowell are urban schools with large minority populations. Franklin County is rural with a large special needs population. Lowell was structured from day one to integrate academic and vocational education and has been working at it ever since. Franklin County is a traditionally structured week-about vocational-technical school with general academic and vocational courses of study running parallel in the same building. Somerville has recently physically combined a vocational high school with a comprehensive one, and is working out methods to integrate programs and schedules. Lowell has devoted considerable resources for a number of years to developing integrated courses. Franklin County has had a pilot program involving two shops, 7 or 8 teachers, and about 25 students a year for the past two years. Somerville is in early design stages of curricular integration. Somerville's and Lowell's efforts are primarily 'top-down'. Franklin County's efforts are 'bottom-up'.

Since we are all at different stages in the process of re-structuring to promote integration, it was decided to produce three separate manuals. Each comes out of the experience of a specific school, and therefore has unique models, strategies and ideas to offer. It is hoped that educators interested in ideas of integration will review all three manuals, taking the best and most relevant ideas from each. We hope that the additional time spent reviewing these manuals will be more than balanced by the diversity of views presented.

## Who produced this manual?

The Academic Vocational Integration Project (AVIP) at Franklin County Technical School has been in operation for two years, and has begun its third. The AVIP teaching team consists of a handful of teachers who designed, developed and, with the encouragement and help of administration, implemented the program we will describe in this manual.

We could have written a general manual on strategies to integrate vocational and academic learning, limiting ourselves to a review of existing literature, surveys of existing state programs, and lists of techniques which someone had tried, and would perhaps work, but this work has already been done. "The Cunning Hand, the Cultured Mind": Models for Integrating Vocational and Academic Education, by Norton Grubb et alia is available through The National Center for Research in Vocational Education. In it a variety of models of integration programs which are being tried out across the nation are described and discussed. We have not read a better overview of the integration 'movement', and we strongly recommend it as required reading for anyone developing a working model to integrate academic and vocational education.

Rather than attempt to cover the same territory, we chose to write about our efforts to create a pilot program, and to document and analyze the principles and processes involved in creating it. This will provide a working model for other schools to look at so that they might adapt these general guidelines to their specific situations. This manual, along with the presentation we gave at the Fitchburg Conference this year, is our report.

There are very few 'old hands' in the area of integration. The need for integration has recently become clear to a whole community of reform-minded educators, and is clearly articulated and increasingly funded at both federal and state levels. One closely-allied product of the movement, Tech Prep, is firmly established and is growing in influence and clarity year by year. However, even the most ardent supporters of Tech Prep acknowledge that the program primarily targets those vocational-technical students who will enter community and technical colleges and universities. What about the vast majority who will not? The means of making integration work for them seems somewhat less defined at present.

We feel that we have a unique and effective model which is, in some ways, more comprehensive and inclusive others we have seen. Our model focuses strongly on 'the forgotten 90%'. We will describe our AVIP program, how it began, how it works, and where it is going. We will describe the activities we have carried out under this grant. We will suggest some strategies. We will discuss obstacles we have encountered. We will tell the story of our program, and hope that it is of interest and value to you.

## What is in this manual?

This manual is organized into four main sections.

**Guidelines and Strategies:** Listed are the elements which we feel are essential to designing, developing and establishing effective integrated programs. Strategies for curriculum development, staff development, and program development are covered.

**Academic Vocational Integration Project at FCTS**: A comprehensive description of the actual program we have been running for the past two years. Scenarios for future program expansion and development are described as well.

**Measuring Up: Grant Activities:** A description of what we have done under this grant to further expand and develop our program. Special programs worked on included **Shop math, Career Choices, Basic Technical Skills** and the **AVIP Summer Teacher Training** program.

**Appendices:** Included is a wide variety of materials which we have used in the course of developing and implementing our program. Curriculum outlines, surveys of teachers, and other integrative materials are included here. Also included are the MVCRC and NCRVE listings of integration materials available.

## The need to integrate academic and vocational education

Programs which integrate academic and vocational education are an ideal vehicle for helping students to achieve higher levels of competency in communications, math and science. However, integration is often limited in practice to the introduction of vocationally-oriented material into traditional academic classes in order to increase the motivational level of students. Although this is without doubt an effective and welcome change in direction of traditional vocational education, we take the concept of integration to have far broader and deeper consequences.

What is often less clearly articulated is that improving the relevance of academic courses for vocational students can make them far more successful in the vocational aspect of their education. The ideal integrated program will structure activities so that academic and vocational learning are mutually reinforcing. It will be flexible enough in approach that **all** students are helped, yet strict enough in standards that neither vocational competencies nor higher academic expectations are compromised. To do this, careful planning at the grassroots level, teacher collaboration between academic, vocational and special needs teachers, and staff training are essential elements for success. We have been guided by a few key principles in developing our program:

- Most students will learn far more effectively in an integrated program.
- What makes an integrated program effective for special population students will also make it effective for other students.
- Vocational schools have the expertise necessary to provide for educational reform and re-train their own teachers.

- The process of developing integrated curriculum is itself essential training for teachers asked to teach in an integrated program.
- Collaborative program/curricular development ensures usable products.

## The problem - from the teacher's point of view

FCTS is typical of many vocational-technical schools in Massachusetts. Shop and academic schedules are on the week-about plan (students spend every other week, all week, in shop). Vocational and academic programs function basically as two different schools within the same building. They run on parallel, non-intersecting tracks.

Academic teachers often feel that the students are at our school mainly for the shops, and are sometimes less than enthusiastic about their academic classes. Vocational teachers often find that students are lacking the most basic 'academic' skills (primarily literacy and numeracy skills) needed for initial success in the shop program.

## The problem - from the student's point of view

Consider the experience of the vocational student in a school where the academic program and the vocational program run side-by-side with little or no connection to each other. One week the student is in shop. Everything is practical, hands-on. Theory is presented only when necessary. Mastery of basic technical skills is the main point and plenty of time is given for practice. Evaluation is based on what a student can do. Shop teachers are from the world of business and industry, where action and results comes first. The student has chosen the shop, likes the work, and has a feel for it. The entire day is spent in the shop, working as a part of a group which, on good days, is a team.

But, there are problems. Perhaps the math needed to move on to the next stage of a job is confusing. Maybe the shop teacher uses a lot of trade vocabulary which the student doesn't quite understand. Sometimes a shop procedure is long and complicated, and the student gets the steps mixed up. Sometimes there are instructions to read, a label to figure out, a new machine to learn how to use. The student needs help, but the shop teacher, running around from project to project and student to student, doesn't have a lot of time. When she does finally come by, the help is quick. Hopefully the student gets it the first time. There often isn't time for a second time around. Overall, the student is somewhat successful. Not great, not bad. Maybe a little frustrated.

The next week the student has academic classes. Except for the related class, not a word is said about what happens in the shop. The math seems quite different, a story is being read and analyzed for literary merit in English class, and in biology class the pulmonary system is being studied. The material, all in all, seems less than immediately useful. The student asks, "What do I need to study this for?" and is told, "You will need to know it someday." This is true, but the student has more immediate needs. He needs help to be successful in the shop, and is looking for a reason to be motivated in academic classes.

We like to think of this project as one answer to a specific student's question. This student was in a math class at FCTS taking a final exam in her senior year/ and was having some difficulty with the section on using fractions. 'Cindy' approached her teacher and, with the dawning light of understanding shining through her question, asked, "Are these the same fractions that we use in the auto-mechanics shop?" When assured that they were, indeed, the same, she was able to finish her test with no problem.

This is a true story. What does this tell us when a fairly bright student makes it through four years of a vocational school without comprehending the connection between fractions that are used in the shop and fractions that are presented in the math class? Do you think that the student was not trying? Do you think that the teachers didn't care, hadn't taught, or weren't competent? Is it possible that there might instead be something wrong with the way our schools are structured, with shop over here and class over there, with vocational and academic teachers never given the time to compare notes, to develop curriculum together, or to learn from one another? Might we find better ways of teaching?

We don't mind when a student asks a question like Cindy's. It is a good one. It is the kind of question students are often afraid to ask for fear of sounding stupid. It is a watershed question. On one side is confusion and incompetence. On the other is the beginning of actual learning.

We want those questions to be asked much earlier and about many different things. We want the student to see the connections between theory and practice, class and shop, work and learning. We want our students to be able to do, to think, and to learn. What else are our schools for?

## What is integration?

Vocational-technical knowledge and academic learning have only been segregated in our schools. The inventors, producers, and managers have always dealt with theory and application as a hand-in-hand process of getting things done. Only in the academic world do we hear people speak of pure math and pure science, almost as though applying theory to practice somehow contaminates knowledge. Educators have bought this particular line, and allowed 'college-track' education to become divorced from the world of industry and business, and technical education separated from traditional academics.

Integration may be a buzz-word, but it is not something new. Integration is a mental process of putting things together, applying theory, and understanding why things work the way they do. Integration is what we want to happen in the mind of the student. The word can be printed on the cover of a textbook, talked about by committees, and funded by the government. But if it does not occur in the mind of the student, it has not happened. It has only been talked about.

Integration is facilitating a student's ability to understand how to apply theory to solve problems on the job, and to become a 'life-long learner', able to learn and change skills and knowledge as jobs and conditions change.

We asked ourselves certain questions that helped us to focus our thinking about integration:

- Does the structure of the school day facilitate integrated learning?
- Does the overall curricular structure of the school facilitate integrated learning?
- Does the training teachers receive facilitate integrated learning?
- Do the kinds of in-service training we have encourage integrated learning?
- Does the specific curricular content of our academic courses offer integrated learning?
- Does the way in which our shop programs operate facilitate integrated learning?

These questions can help to point out specific areas where schools could begin to evaluate their own programs.

# STRATEGIES AND GUIDELINES

# Strategies and guidelines

## Introduction

The following is a compilation of strategies and guidelines which we try to follow in the continuing development of our program.

These guidelines cannot be treated in isolation. Almost all of them need to be prefaced by the phrase "given ____________" where the blank will usually include - sufficient planning time, a well-structured curriculum, teacher input into structuring decisions, voluntary membership in the development and implementation team, support from above, and so on. For us, this whole program is a kind of net - with all the parts interconnected. You cannot take one part out without damaging the others.

## Integrating curriculum

### A developmental process: recognizing the necessity of integration

Most academic teachers have been trained and have practiced for many years to teach their curriculum in isolation from other teachers, ideas, or disciplines. Especially in the secondary schools, including vocational/technical schools, the academic curriculum is decided upon or developed within each department (math, English, social studies, etc.). Many times each department develops its curriculum in isolation without meeting with members of other departments and disciplines. Although there may be an administrator who is responsible for curriculum development, the reality is that **true** coordination is not insured. Courses are taught, and teachers proceed to deliver the subject matter with the necessary enthusiasm and skills. It is **assumed** that this material is mastered, internalized, and integrated in the students' minds. This has been the tradition of secondary education.

Vocational/technical curricula are developed in a slightly different process, but the result appears to be the same. Electrical teachers develop the electrical curriculum together, while the culinary arts teachers are together developing the curriculum for their shop. It is assumed that the academic skills necessary to be successful in the chosen shop or trade will be taught by the academic teachers. Rarely, however, is there an academic teacher involved in any curriculum development of shops. By the same token, rarely is there a shop teacher present when curriculum is being developed for academic courses.

Although teachers always hear the age old question from their students, "When am I ever going to use this?" it is sometimes difficult to provide the answer. Some academic teachers have begun to realize that relating the material to real life situations makes sense.

Believing in the idea of integrating academic and vocational education is actually a developmental process. Each teacher, whether he/she is an academic or shop teacher, must go through this process of realizing that "integration" is a way to help students become successful. It became apparent when talking with other teachers and administrators that some were much farther along in this

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developmental process than others. It is felt that everyone **must go through this process** as he/she begins to create, teach, or administratively implement an integrated curriculum.

Initially teachers and administrators are wary of change. This could be called the **"Denial or Doubtful stage."** It seems that as they look at the concept of integration, they experience a variety of doubts:

- Integration is too limiting. We will be giving up too much of the traditional curriculum.
- Integration will do away with related instruction.
- Academic teachers do not know my trade. How can they teach this technical information?
- Integration is just like everything else ... it is just a fad that will go away, and we can go back to teaching the way we always have taught.
- Students need more than just applied communication... they need to read literature.
- I don't want to work with anyone to help me develop my curriculum. I don't need any help.

Teachers and administrators need time to go home and think about this concept of integration. They need to be allowed to discuss with their colleagues their own ideas about what they think integration is, and what they think it should be. When they are allowed time to digest these ideas, they will be less negative about them.

The next stage in this developmental process seems to be the **"Show Me"** stage. Curiosity has been piqued, and faculty and administrators are not as negative about this new idea of "Integration."

- Teachers and administrators seem to want more information.
- Workshops are scheduled.
- Teachers want to see what other teachers and other schools are doing.
- Much conversing goes on between those who are more involved with integration and those who are not.
- Questions are asked concerning their doubts. Answers are being provided.

It appears that the next developmental stage seems to be **"Experimentation."** It is here that "Integration" can be quite successful, or it can fail miserably. If a teacher or group of teachers, along with administration, decide they wish to experiment with the idea of integration, wonderful ideas can be implemented. When an environment is created where teachers can develop their own ideas (yes, even if they are **"re-inventing the wheel"**) and explore and expand upon these ideas, those involved take ownership of the integrated program. They are willing to put in the long hours, meet with teachers "from the other side" and begin to integrate their curriculum. **However,** if these teachers are willing to experiment, and the administration does not provide the support (both emotionally and structurally), the teachers will run out of enthusiasm and energy.

***Integration is hard work!!*** This must be recognized by administration, and it must be there to support the teachers who are trying this new concept.

However, when the ideas of integration are forced upon administration or the faculty, strong resistance will be encountered. Because this is such a change from the traditional structure of academic and vocational educational, it **takes time** for some to process that this is a 'logical way' to structure a school. Attempting to implement integration before people have begun to 'buy into' the concept will **doom it to fail.**

The next stage in the developmental process seems to be the **"Enthusiastic"** stage. Once the teacher has attempted a few lessons where the curriculum is integrated and things have gone well, enthusiasm runs rampant. Teachers are excited and want to share what they are doing with anyone who is willing to listen! This can be a time where administration takes advantage of this energy and channels it in a productive way. The administration can quickly squelch the ideas, however, by failing to be supportive. **Feedback** to the teacher is very important at this stage because the teacher is still not 100% confident that what he/she is doing is the right thing. There is a nagging guilt that the traditional curriculum is not being followed. Perhaps there are things that are not covered that traditionally have been. It is imperative that the enthusiasm is encouraged and maintained.

The final stage seems to be the **"Assimilation"** stage. By now the teachers and administrators have lived with the concept of integration for at least a year or longer, have experimented with implementing various programs and feel very strongly that integration of academic and vocational education is of extreme benefit to the students, teachers, and the community. They are now willing and capable of sharing their knowledge and experience with others who are in the beginning stages of this developmental process. It is at this stage that integration is beginning to be fully implemented and students, parents, teachers, administrators, and the community truly see the benefits.

## Developing integrated curricula

### Integrated curriculum needs to be jointly developed

If curriculum overlaps two teaching areas, it needs to be jointly developed, reviewed, revised, and evaluated. A carpentry teacher cannot develop an integrated related carpentry curriculum in isolation from academic team members who will be responsible for teaching the integrated skills in their courses. Academic teams of teachers cannot develop effective 'applied' courses without direct and comprehensive help from vocational teachers.

### Teachers need time to develop new curriculum

Veteran teachers are generally teaching to their limits on a daily basis. They have developed techniques which enable them to be maximally successful within the limits of the schedule, the staffing, and their own time constraints. It is overly optimistic to expect that they will be able to add a significant time burden to their daily schedule simply because someone tells them that students will learn better with an integrated approach. If they are not allowed sufficient time to develop the new curriculum they are expected to teach, they will simply teach what they already know best, or do a poor job trying to teach to someone else's ideas. If relevant integrated curricula are adopted or adapted, there is still a considerable investment of time needed for the teacher to make that way of teaching their own. This time must be budgeted for if the program is to be successful.

### Development of integrated curriculum is an on-going process

The shift to an integrated approach to curriculum-development is a significant one, and finished products cannot be expected to appear overnight. Once a portion of a curriculum is presented, the teachers directly involved need to meet and evaluate the content and methodology. Areas that went well need to be identified. Recommended changes should be noted. Just as the curriculum is team-developed, it needs to be reviewed by the team on a regular and scheduled basis.

### A common curricular format should be adopted within a program

A fully integrated curriculum will have a significant number of tasks which are suitable for learning in more than one setting. To facilitate curriculum development and revision, student comprehension, testing techniques and record-keeping, a common format should be adopted or developed. We recommend that it be performance-based. One potential model can be found in the appendices of the Grant Activities section of this manual. When academic 'tasks' and related 'tasks' are located on the same task listing, the artificial boundary between academic and vocational begins to break down. Just as the curriculum needs to be a team product, the format itself must meet the needs of all of the teachers involved, or it will not be used.

### Curriculum should be computer-based

Although it seems almost too obvious to state, all integrated curriculum should be stored on a computer data-base. Computer literate teachers should be free to access and quickly revise all of the curriculum within a given program. Teachers should jointly choose a word-processing program, as well as basic computer type (IBM or Macintosh compatible).

### Academic teachers need actual experience in the shops they are expected to integrate with

Although all vocational-technical teachers have some experience in academic classrooms (having at least been students), many academic teachers have virtually no experience in the vocational-technical shop or lab. In many cases, academic teachers went directly from their schooling into teaching careers, and are unfamiliar with many commonplace working environments - factories, construction sites, and retail businesses. This puts them at a profound disadvantage when they are asked to incorporate job-related skills into their academic curricula. Their knowledge, through no fault of their own, is often second-hand, and it is therefore difficult for them to recognize or develop authentically integrated materials.

Even if they are working with a team of vocational and special needs teachers to jointly develop integrative learning materials, it is often difficult for them to appreciate what academic tools and knowledge their students need to have just to have initial success in employment-training programs.

We think it is essential for academic teachers (and administrators! and guidance personnel!) to spend some significant time in the shops, to see how and where, and under what conditions their students are actually expected to apply the academic skills they are teaching them. Until you have seen a student struggling to compute a math problem amidst the noise and activity of a working shop, it is hard to appreciate the level of mastery which we should be establishing as a base.

### Shop teachers need academic teachers to help them identify the actual math and language skills students are expected to use on the job

Many times, specific applications of technical math and language skills escape the notice of the shop instructor. What is common knowledge to the shop teacher, is often a foreign language to the student. Trade vocabulary is a good example of this. English teachers could quickly compile dictionaries of trade terms specific to each shop. Shop teachers, using specialized vocabulary daily, tend to lose sight of what is common knowledge, and what is specialized. Skills that the shop teacher learned a long time ago seem to him to be 'common sense' in the trade. Shop teachers can forget this learning process and cannot understand why the student doesn't 'get it.' The solution is to bring in an outside consultant (math or language teacher) to identify where academic help is needed.

**Academic teachers need to spend some time in the shops - at the same time that the shop teacher is there**

If an academic teacher is assigned to 'cover' a shop while the shop teacher is elsewhere, no learning or sharing of teaching techniques will take place. The academic teacher needs to experience the environment of a working shop. He needs to watch the shop instructor present the material and even ask questions that any new student might ask. Many times the academic teacher will ask the question a quiet student was afraid to ask.

**Curriculum content should be developed by teams of shop, academic, and SPED teachers to establish effective integrated teaching methodologies**

The third key to the whole concept of integration is including the expertise of special needs teachers. Because they have specialized in understanding the learning process itself, they are able to identify likely pitfalls for students. They can help vocational and academic teachers establish collaborative teaching techniques, designed to accommodate a variety of learning styles, which have a high potential to succeed.

Again, this idea is not new. The concept of having an 'itinerant teacher' come into the classroom and tell the teacher what to do was tried in the early seventies. Perhaps one of the reasons this idea was not successful was that this teacher was not part of the team. The classroom teacher felt threatened, and the 'itinerant teacher' felt unwelcome. With our model, all teachers are part of a team. Everyone works together, feels important, valuable, and is recognized for his individual strengths and expertise.

## Recognizing authentically integrated curricula

Our students need to learn how to do things, how to think, and how to learn. We believe that all of these skills should be taught everywhere in our school. Certainly academic classes will tend to emphasize theory over application, and related classes emphasize the reverse. However, learning trade skills without understanding the technical knowledge and theory behind them will doom our students to low-wage jobs.

We are aiming at developing a fully integrated 'related' curriculum. Related class, in our school, is the place where academic and vocational skills overlap. This is where we began to look at what our students are learning. Not all skills covered in related class overlap with skills in academic classes. However, students need certain generalized math and language technical skills in order to study certain kinds of 'related' skills. A good example of this is a carpentry student scaling a measurement directly from a set of blueprints for the house project in order to determine the exact location of a window in a wall. The student needs to know how to find the wall on the drawing, interpret basic symbols, and read a number line (either on a ruler, rule, tape measure or architect's scale).

When the student is doing this, is it a trade skill to be taught on the job at the house, or a related skill to be covered in related class by a certified carpentry teacher? Or, should it be taught as a generic technical drawing skill by a drawing teacher? Or, is it a generic technical math skill that should be taught in a math class?

We think it is all of these. The more places essential trade skills are taught, the more they are reinforced in the student's mind. The more teachers in an integrated team know and understand the exact use of a particular technical skill in a particular trade, the more accurately they can address the students' initial learning needs.

Since the academic and trade related curricula have been isolated from each other for so long, it is sometimes difficult to know what a truly integrated curriculum might look like. So, we have developed certain rules that we go by.

In general, when looking at integrated curriculum 'skills,' we ask the following questions:

- Does the curriculum reinforce both vocational-technical and academic skills?
- Could it be taught in more than one place?

For trade-oriented material incorporated into academic classes:

- Are entry-level skills covered and mastered first?
- Is testing performance-based?
- Is the student learning the application along with the theory?
- Does it include a skill a person would actually use on the job?
- Does the student understand where she would use this in her shop?
- Will learning this skill improve the student's ability to succeed in their trade?

For academic-oriented material reinforced in related and shop classes:

- Is the student learning the theory along with the application?
- Will the student be able to apply his skill or knowledge to a new situation?
- Will learning this improve the student's ability to learn in academic classes?

As we work in teams to develop curriculum, we suspect we are on the right track when we look at a curriculum 'item' and suddenly wonder - 'Well - where should we teach this one? And who should teach it?' Many times we decide it will be addressed in all places, but we will agree who will present it first and how the others will reinforce this concept in the other places.

**Where would you apply these guidelines?**

If you are going to teach in a new way, you generally need to adapt, adopt, or develop new curriculum. A lot of old curricula is being rushed to market under the label of 'integrated' in order to cash in on schools' needs to conform with the new Perkins regulations. Much of it is a re-hashing of un-integrated material with little improvement. Even some of the best products with excellent parts have other sections which appear to have been developed without review of vocational teachers.

The test? If a vocational-technical teacher and an academic teacher both review it, and think that it will teach skills which the student needs in both places, it is probably effective integrated material.

**Putting the technique first, the job second:**

Students who have not mastered basic arithmetic skills should be encouraged to use calculators. They can still understand the process and calculate the correct answer when the mechanics of computing confuses them. All the students in the AVIP program have purchased a calculator recommended by the AVIP teachers. After being shown how to operate and perform all the functions, the students are required to use this tool to help them solve complex problems. Students learn that this is a tool that must be carried not only to math class, but to shop and related class so they can get the job done. They use them whenever it is necessary. This allows everyone to be on an equal basis in developing problem solving techniques.

**Incorporating 'generalized' learning into shop situations**

Often, in describing what integration means, it is said that 'generalized skills should be covered in the shops.' These are the factors which we think are essential to success:

**Shop teachers should teach application and theory**

If we say that vocational education now has a dual task, to both prepare students for entry-level positions in the world of work and prepare them to be lifelong learners ready for change, then our curricular structure should clearly reflect that mission.

For example, in the carpentry shop we are not just training carpenters. We want to train carpenters who are comfortable with math, who can use it competently on the job, and who can also apply it to new situations when they need to. We want a student not only to know the 3-4-5 method of squaring a frame, but also we want her to know that 6-8-10 will work equally well, that inches or feet or meters will give the same result, that right triangles have 90 degree corners, and that the 3-4-5 method is one application of the Pythagorean theorem which she can use to solve other problems on the job. If a student is to become a carpenter, we want him to know how and why this method works, and how and when to use it. But if a student should have her sights set on engineering, we want to present this method in a manner which clearly shows both the application and the theory behind it. To do less would be to cheat our most promising students. Therefore, when we teach application, we should teach theory. When we teach theory, we should teach application. Related and shop teachers have to teach theory as well as application. Academic teachers have to teach authentic applications as well as theory.

**Related class should look more like shop. Shop should look more like related.**

We are often reminded that most students learn best in hands-on situations. We are also told that 'shop teachers have always known this'. Well, even shop teachers can forget this when they are related shop teachers. They tend to teach in the classroom environment the same way they were taught when they were students in school. But students learn best when hands-on activities are incorporated into the learning process. When shop is one week, and related the next, embedded in a week-long program of academic classes, even motivated students can sometimes lose sight of the connection between what is covered in related class and what they do in shop. Tools and equipment which can easily make the transition from shop to class should be brought in, and worked with, to reinforce basic technical skills. For example, if teaching a unit on fastening devices, the teacher should have students handling, measuring, and sorting different kinds of fasteners, as well as reading about them or seeing a filmstrip of some kind.

In a similar way, students often lose their way when confronted with complex tasks in the shop environment. Even if lack of technical academic skills are not impeding their progress, trade knowledge which was supposed to have been learned in related class is often not available to the student. They have forgotten, or were absent that day, or were not paying attention. It is therefore important to build some elements of the classroom into the shop to reinforce and build upon material which was previously covered.

**Writing skills can be developed in shop and related as well as in language classes**

The note-taking skills required of students in many academic classes can be reinforced in shop and related classes as well. A shared format which is developed by the team of teachers can cut across class/shop boundaries will reinforce the skill as well as the idea that critical thinking, listening, and analytical writing skills are as essential for success in the shop (i.e. the real world) as they are in the academic class. Please see an example of this in the Grant Activities section of this manual.

## Developing Learning Skills

In any learning environment, be it a comprehensive high school, a vocational/technical high school, or the world of work, learning is ongoing. If the student or worker has highly developed learning skills, this task of learning becomes easier and success is almost guaranteed. He/she will not be limited to the jobs that require only the skills that he has mastered by graduation. He is ready and able to learn and develop new, more advanced skills as the need arises.

How does a school produce these successful learners? The answer to this question seems to lie within a team of highly trained teachers and the student who wants to learn. These teachers need to be trained to look at and identify specific learning styles of their students.

Is the student:

- A visual learner?
- An auditory learner?
- A left brain learner?
- A right brain learner?
- A concrete-sequential learner?
- A random-abstract learner?
- A learner who must be moving and doing?
- A learner who needs quiet and few distractions?
- A learner who needs material presented in a variety of modalities?

This list is just a small sample of the many different styles of learning that exist. It is crucial that members of an integrated teaching team be familiar with the concept of the learning process and learning styles. As the learning style of each individual student is identified, these teachers must then enlighten their students. When a student has recognized and accepted the style in which he/she learns best, he/she can **then** develop strong learning skills.

The teaching of specific learning and study skills should be incorporated into every teacher's curriculum. Teachers cannot simply state that students need to learn how to study. We need to show them, on a daily basis, in a consistent manner throughout the day how to be a successful learner. This consistency is insured when there is a team of teachers working together, all knowing what is expected of the students throughout the academic and shop experience. Styles of learning and methods of study need to be discussed by the team members and a standard level of expectation should be agreed upon.

Once the student understands what is expected, and has developed successful study skills modified to her learning style, she can **then** become a consumer of learning. She is **then** in control of her learning. The student comes to the learning environment with confidence and motivation. She **knows** she can learn the material. She **knows how** to learn the material.

Developing this high level of understanding does not happen overnight. This is a process that takes some time to develop. Teachers working together as a team, watching their students learn, and discussing and identifying the strengths of their students takes time. Helping the students to identify and be responsible for their own learning styles takes even longer. It is worth the time and effort. If our students graduate not only with employable skills, but also with strong learning skills, they will be valuable workers and employable for their entire lives.

## Developing Employability Skills

In a vocational school, it is crucial to remember that we are training students to get and keep entry-level jobs in the trades they are learning. Technical and general academic skills are not enough by themselves to enable students to remain employed. Basic employability skills are equally important. Although virtually all good shop programs include elements which encourage the development of employability skills, shop programs which teach these skills in a consistent, systematic and effective manner are harder to find. Both academic and vocational programs in school often accept kinds of behavior which would get a student fired on a real job. While it is true that our classes are filled with students, not employees, and that they may well 'rise to the occasion' when they are actually getting paid for their work, we are doing them a disservice if we do not clearly explain and expect attitude and behavior consistent with real-world job environments.

To the extent to which the shop environment shadows the work environment, it is fairly easy to build in expectations of student behavior consistent with the real world. This is especially true in production-oriented shops. In the academic environment, or those elements of the vocational laboratory which resemble the classroom, it is a little more difficult to emulate the job expectations students will face when they enter the work force. However, some elements can be easily built in:

**Attendance expectations should be uniform in both shop and class within an integrated program**

Students are apt to try to convince themselves and their teachers that their shop classes are important, and their academic classes do not matter too much. Integrated programs destroy this argument, as anyone can clearly see the relevance of both shop and academic classes to the student's future performance on the job. Because of the near-impossibility of making up work missed in the shop, we have long had very stringent attendance policies in the shops. We recommend that students be held to the same standard for their academic classes.

**Student should be prepared for shop as they would be for work, and should be prepared for class as they would be for shop**

Beginning this fall, we will be enforcing consistent rules concerning preparation for class and shop for the students in our integrated program. We are going to require that they come to class and shop with the appropriate tools. In shop this will include the usual work books, safety glasses, safe clothing and tape measure or rule. In class this will include the appropriate textbook. For both class and shop we are adding - a notebook, pencil and calculator.
(see "Letter to Parents" in "Appendix: Miscellaneous Materials")

**Teamwork and cooperation are essential employability skills, and can be learned**

Although some students come to us with team and cooperative skills more fully developed, all students can improve these skills if shop and class activities are structured to support and encourage them. In certain trades, shop environments provide a natural place for teamwork to occur. For example, putting up a heavy wall on the house project requires the help of everyone. When students attend shop with the same group of students for long periods of time, they tend to team up with certain compatible people within the group. This built-in advantage of the vocational shop is carried over into the academic classes if that same group of students attends a few classes together during the academic week. In this way, an integrated program more closely mirrors the reality of most job situations, where you work with the same group of people throughout the day and from week to week. The fragmentation of the traditional academic day into eight classes, with different groups in each class tends to be a false and divisive kind of schedule.

## Integrating teaching strategies

### 'Clustering' closely-related shops for math and language classes

In our program, Carpentry and Plant Maintenance students were initially clustered together for their integrated math and language classes for pragmatic reasons. We could not afford the staff time necessary to teach one shop alone. By combining students from the two shops, we were able to maintain an enrollment level acceptable to our administration. Although at first the combination of students from two only somewhat related shops caused some difficulties in terms of choosing appropriate content, as time went on we began to see some advantages as well.

For example, in an 'applied' math class, with students from as many as twelve different shops, it is difficult at best to draw on enough applications of a principle to make the learning immediate to the whole class. 'Applications' tend to become merely examples, and the curriculum is apt to stay focused on the general, the theoretical and, to many students, the irrelevant.

In a 'related' math class, with students from just one shop, the danger lies in the opposite direction. Applications can take precedence over generalized math skills, and learning can remain too narrowly focused.

In an 'integrated' math class, application and theory are given equal weight. Clustering actually encourages this balancing act, providing the possibility of real concentration on specific trade skills and applications, with enough diversity of applications to necessitate generalized math skills as well.

## Providing special-needs help in the shop

It is a curious fact that our vocational schools are set up to supply comprehensive help to special needs students in their academic classes, but that little or no comparable help is available when the student goes to the shop. Why this is remains something of a mystery. Perhaps the potential cost is a factor. Perhaps the system was designed by people who were themselves primarily academically trained, and subconsciously consider all skills one learns in a shop to be 'manual' skills, thus not requiring special help. At this point, the system has been self-perpetuating for some time.

In any case, does anyone who considers it closely, really think that learning to adjust a carburetor is a less complex task that adding and subtracting fractions? Would a special needs student would need less help in that situation? Are the skills a special needs student learns in their vocational shop somehow less important to their schooling than what is covered in their academic classes?

### Improving teaching for special needs students improves it for all students

It is sometimes feared that adjusting teaching techniques to accommodate special needs students will somehow slow down the rest of the class. In shop, we have found the reverse to be true. Although some students have diagnosed learning disabilities, and many do not, it appears that learning problems are on a continuum, and that learning is difficult for everyone, to greater or lesser degrees. If teaching techniques are changed to make material more comprehensible to special needs students, the so-called regular students seem to catch on much more quickly as well.

We have also found that many students are failing to master the most basic techniques in the shops. These skills are the crucial ones in a trade, because everything else is built upon them. If the pace and range of shop material covered slows just a little to make sure that the basics have been mastered by everyone, everyone seems to benefit.

### Providing special needs help in the shop frees the shop teacher to teach the trade

Many of the skills which students fail to master in the shops could be taught by any competent adult who has learned that skill. For example, selecting the proper drill bit to drill a clearance hole is a straightforward procedure, and does not vary much from shop to shop. If a special needs teacher is trained in a wide range of these simple tasks, and can spend the necessary time with a student who learns slowly, or just does not 'get it' at first, the shop teacher can then be free to teach more advanced skills to students who are ready for them.

**Providing special needs help in the shop greatly increases special needs students' chances for success**

In many cases, special needs students have never received adequate help in the shops. This is emphatically not the teacher's fault. Shop teachers are generally greatly overextended even on a good day, and have only small amounts of time to offer in individualized instruction to needy students. If a student doesn't get it quickly, they often do not get it at all. Students are unable to take the learning problems they experience in the shops back into the resource room for help from their special needs teachers. Even if they could, special needs teachers seldom have any direct experience in the skills and techniques their students are supposed to negotiate.

The upshot of all of this is that we probably have very little idea of what our special needs students could actually learn, if they were given the proper help at the proper time. Both the students and their teachers are left thinking that the material is probably just too difficult for them. We suspect that the reverse is true. Not all students are going to be rocket scientists, it is true, but it is generally true, as CBVE proponents claim, that given adequate time and instruction most students can master most tasks to a high degree of proficiency.

Given current economic conditions, it is unlikely that full-time special needs help could be provided for all special needs students in vocational shops. However, even a little bit of help goes a long way. If a SPED teacher is scheduled into a vocational shop for a few periods a day, the shop teacher will quickly learn to plan teaching around the availability of help, or even to ask students to hold over certain problems to the next day.

When help is provided, it should be consistent and on a daily basis. Both students and teachers should be able to plan on it.

**Special needs teachers need to be assigned to the same shop for an extended learning period**

It takes a while for anyone to get used to any shop. Special needs teachers are no exception. The working environment, the tools and equipment, the trade vocabulary, the overall 'feel' of the work and the workplace are all quite new to most special needs teachers, and a period of accommodation must be built into any scheduling plans.

In the beginning, students can function as the SPED teacher's teacher, thus reinforcing their skills and increasing their confidence. The SPED teacher, as an adult learner and expert in learning styles, should soon learn to troubleshoot problems students are having. Often, she can function as a *translator* for the student, transmitting a complex series of instructions at a pace and in a manner which is accessible to the student.

## Including SPED students in the Integrated Academic Classroom

Massachusetts' Special Education Law, Chapter 766, and the United States Public Law 91-142 that was patterned after it require that schools identify students with special needs and provide for their education. The law also states that these students remain in "the least restrictive" environment as possible. Although some Special Needs students will be most successful in a segregated classroom and shop, many will be more successful if they are included in the regular academic classes.

When the needs, goals, and objectives are identified by the Special Needs Evaluation Team, they are written into that student's Individual Educational Plan. If there is a need to develop language, reading, writing, and/or math skills, many times the student is placed in the resource room with a highly trained and specialized teacher.

While this may appear to be ideal, we feel that it might be limiting. The student is not in the same room with other students who have additional ideas and views and who also learn at a faster pace. The Special Needs student in the resource room hopefully feels safe, secure, and nurtured, but he/she might also feel unsure of his potential. High school students in the resource room **cannot be fooled**. They know **exactly** why they are not in regular classes.

What happens when the same student is mainstreamed into an integrated classroom that is team taught with that same Special Needs Teacher and an academic teacher who welcomes both the students and teacher? The sky is the limit!!! In the two years that the program has been in place at FCTS, many of these students have achieved far beyond what could have been predicted.

The Special Needs teacher works as a vital member of the AVIP team while designing the curriculum. However, she is also looking at the objectives that have been identified in the IEP's of the SPED students that are included in these classes that he is team teaching. While he is responsible for these objectives, he is not limited to only teaching the SPED students. **All the students** in the integrated classes benefit from his specialized training.

The material that is presented in these integrated classes is relevant, authentic, and challenging. When questions arise, when a student is confused, there are two teachers in the room to provide assistance. The Sped Teacher is watching all the students. Because of the specialized training, she can identify where the student is experiencing difficulty understanding a concept. Because she has co-developed the curriculum, she has an understanding of it, and can provide remediation **immediately.** The student begins to experience success, and is more willing to stretch himself. He realizes that he **can learn. He looks around and sees himself as a capable student, perhaps for the first time.**

Through the team-teaching process, the academic teacher is also becoming more skilled in understanding the learning styles, abilities, and disabilities of a wider range of students. The idea that teachers can develop additional skills and knowledge from other teachers should be encouraged. Just as our students are being encouraged to become life-long learners, so should we teachers admit that we also are life-long learners.

Although this model for integration and inclusion is successful, there are certain conditions that must be met:

### Class Size

Because of the nature of the Special Needs Students in the class, it is ideal when the class size does not exceed 20 - 22 students. The percent of SPED students with specific objectives in that subject area (i.e. reading or math) should not exceed 30 percent.

### Overall curriculum design

An overall design must be in place before the course begins. Otherwise the SPED teacher may be reduced to the role of an informed, highly trained aid in the classroom. The academic teacher may be inclined to teach the course in a traditional, if not habitual way. If the overall curriculum design is intended to be an **integrated approach**, where vocational/technical applications are stressed as much as scientific theory, and if the SPED teacher has had extensive exposure to the student's shop, his role becomes a dual one.

The SPED teacher's role as Shop Liaison should include responsibility for interpreting shop applications of academic material. The academic teacher could also perform this role as Liaison, if exposure to shop practices and applications has taken place.

## Sharing teaching techniques

**Performance-based testing in integrated academic classes clarifies expectations**

Traditional academic curriculum teaches knowledge in units, and grades on a passing scale from A to D. Traditional shop curriculum teaches specific skills, and grades on a pass/fail basis. Correctly mounting three out of four tires onto a vehicle is not a 'C', it is a total and dangerous failure. The skill is only learned when it is mastered, and grading is done accordingly.

Within integrated academic classes, if the tasks the students are expected to master are directly related to shop skills they need, performance-based testing will seem like a natural method to apply. In fact, one test of whether or not a task is an appropriate one for an integrated academic class might be whether or not it can be graded on this basis.

**Some assignments need to be taught and graded in more than one place**

Input from all teachers involved is necessary during design, implementation, and during grading as well. For example, an assignment to do an accurate and complete cost-estimate of a carpentry job might well be dealt with in related class, technical math class and technical language class, all on the same day, or during the same week. If sketches of a proposed project are a necessary part of the estimate, technical drawing class also might get involved.

Teachers can reinforce basic skills from other classes within the context of a well-designed integrated assignment.

## Assessing and evaluating student progress

Designing a method and a series of strategies for assessing and evaluating student progress is sometimes overlooked, and the complexity of this task is underestimated. Teachers have always been charged with the responsibility of grading their students, and it has been assumed that it is quite easy to assess the knowledge gained by these students. Students are subjected to written tests of one form or another from the time they enter kindergarten to the time they receive their high school diploma. It would be easy to evaluate student progress if the results from these written tests could accurately identify the mastery of skills other than reading, writing and basic arithmetic. Although standardized tests are currently used to determine skills of students throughout the country, there are many psychologists, guidance counselors, teachers, and students themselves who are quick to point out that this form of testing does not always give a true picture of a person's skills and progress. These tests should only be used to give an indication of a range of mastered skills.

It is the feeling of the members of the AVIP team that when students are presented material that is truly integrated and authentic, they will genuinely strive to master the skills. They are being successful and learning eagerly because they see the relevance and importance of it. It has been observed again and again that when the relevance of the material is obscure, the students perform at a level only sufficient enough to earn the desired grade. Many students think and state, "As long as I pass, it is good enough." It is unrealistic for teachers to believe that all students will work for an "A."

It is also difficult to determine from a letter grade (whether it is an "A" or a "D") the level of mastery of a skill. Many times attitude, effort, participation, etc. are factored into a letter grade. Just exactly what does an "A, B, or C" indicate? Are the standards and criteria the same from teacher to teacher?

Developing a method to authentically assess student progress is one of the top priorities of educators throughout the state. Core competencies for 30 occupations are currently being developed by Northeastern University's Center for Labor Market Studies under a contract funded by the Department of Education. This will facilitate the development of a system for assessing competency gain and competency attainment as required by the Perkins Act. Standards for a certificate of occupational proficiency will also be developed as part of the Education Reform Act.

**Pre-assessment of students, technical and academic**

New teaching methods are worthless unless they result in improved student learning. Those of us involved in the AVIP program at FCTS have become convinced that 'integration' is an effective new method of teaching. However, our experiences and reflections on our program are by necessity somewhat subjective - this is, after all, our 'baby', and we do feel like proud parents. Administrators, school committees and taxpayers need and deserve evidence a little more substantial, at least after the first few years.

If we want to show how much our students have learned, we must first show what they knew and could do when they came to us, and then again what they have learned when they leave. So, program evaluation really depends upon effective pre- and post-assessment of student skills and knowledge. Without such measuring tools, evidence of success has to remain anecdotal.

Since we are measuring skills as well as knowledge, assessment methods must include both knowledge tasks and occupational tasks. Since we are aiming to teach students **how to learn**, as well as specific knowledge and skills, truly effective evaluation techniques must find a way to measure that ability as well.

A number of models of 'authentic' assessment are being developed throughout the country. Most are including employability skills, teamwork skills, and problem-solving skills along with traditional academic and vocational skills. Although we can continue to develop and implement integrative models for voc-tech schools, these kinds of comprehensive assessment techniques will aid us in showing the effectiveness of our programs.

The new federal standards, if properly carried out, will drive curriculum reform throughout the voc-tech community. Students who have not integrated their knowledge and skills will not be able to test well on a properly designed assessment instrument.

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## Teaching in teams

The concept and practice of team teaching certainly are not new. It has been done successfully throughout the country. When the idea was presented as part of this program, team teaching had not been practiced by many academic teachers. However, certain shops in the school had designed programs where the teachers within their own shop worked together as a team.

**Teachers who teach together need to have scheduled time to plan together.**
The special difference in this AVIP program is that there is a team of five teachers (an English teacher, a math teacher, a special needs teacher, a carpentry shop/related teacher, and a plant maintenance/related teacher. Although not all teachers team teach together at the same time, they are all vital members of the team. It is imperative that time is provided where all members can meet together to plan and develop the program.

**Team-teaching is a new skill for many, and considerable time must be allowed for teachers to adjust to it.**
To begin a program where teachers are going to work together as a team, certain things should be considered. **First,** all teachers must be willing team teach. Most academic teachers feel quite comfortable closing their doors and teaching their lessons while they are the only trained educator in the room. They develop their own style that suits them and works quite well for them. It must be recognized that having another teacher in the room at the same time can be quite threatening at first. It takes time to develop confidence and trust with the other team member. To expect everything to run smoothly, without strain and stress, would be unrealistically optimistic. This is hard work, and these teachers must be aware in the beginning that they are going to work harder than they would if they were not team teaching. It has been stated that one of the goals for our vocational/technical students is that they learn to work as a productive member of a team. One of the best ways to teach them how to do this is for the teachers to model that behavior.

**Teachers who teach together need dual (although not necessarily equal) responsibility for curriculum planning, teaching and grading of students.**
**Second,** teachers that are going to team teach must have co-planning time built into their schedules. The curriculum and the daily plans should be decided on together, and methods of presentation should be agreed upon. Mutual standards of student performance and assessment should also be agreed upon. Without this co-planning, it is easy for one teacher to become a highly trained aide for the other. When this happens, and it sometime does in the beginning, it can lead to frustration for one or both of the team teachers. Each teacher needs to develop patience and tolerance for the other member and be aware that it will take time for a team to work well together.

**Third,** team teaching can be extremely rewarding and rejuvenating for teachers when it is done successfully. When teachers are feeling successful and positive about what they are doing, their students benefit. When a larger number of teachers are working together coordinating the curriculum on a regular basis, every one profits. The students are aware that the math teacher knows what is being taught in related. The related teacher knows what is being covered in English, and the English teacher knows what is going on in math class. Students see the importance in what is being taught. They begin to see that what they are doing is authentic and valuable to them. (After all, it is important enough that all their teachers know about it!)

## Training teachers

### Staff training

It has become very clear after two years of this program that even very good experienced teachers have habitual methods of teaching which will be used even in new and sometimes inappropriate situations. It is very easy for a program to appear to be innovative, while the actual learning experienced by the students is no more effective than the old. It is also clear that these teachers want to do a good job, and become inspired when allowed time to confer with other teachers, develop curriculum, and have the time and energy to experiment with more effective techniques.

In other words, not only is it true that if a student isn't learning, the teacher isn't teaching - it is also probably true that if a teacher isn't learning, he isn't teaching especially well either.

Therefore, we need to structure our integrated program in such a way that learning by teachers becomes the given, rather than the exception. This can only be accomplished if teachers are given sufficient time to learn. The best source of that instruction, in a vocational school, is the other teachers. We need to lay-out portfolios for teachers, which would include a kind of overall learning plan. This is no doubt the intention behind regulations concerning professional development.

It has to be made clear that the structure of the schools has created false divisions within the fields of knowledge, that the teachers have been trained within those structures, and that no one is at fault. However, we have the responsibility to repair the damage wrought by a system of education which emphasizes theory over application, and rewards rote repetition of disconnected facts rather than thorough-going understanding of basic principles and applications.

## Using computers

Computer literacy is such an essential skill for most of the jobs of today and (probably) nearly all of the jobs of tomorrow that the development of this skill should be given a very high priority - for students and for teachers. It is also such an effective skill for using a variety of learning programs and techniques that all students should be expected to achieve and maintain basic computer literacy from the 9th grade on. We recommend that testing be performance-based, and that word processing software be standardized throughout the building. It is important that software be chosen for ease-of-use. Although the people who sit on the committees that choose software are often computer-literate and sometimes computer 'buffs', the danger is that they will choose packages which are less than user-friendly. For the occasional computer user (most all students and most all teachers), we find graphically-oriented software to be far more usable. For a smaller investment of time, people can experience increased success and be more productive.

Many teachers are not computer literate. We suggest that computer courses be offered, that base standards be established within the building for the teaching staff, and that everyone be paid in some way for developing this skill. Either their training should qualify as professional development and/or they should be allowed to develop this skill on school time. Once everyone is trained and is comfortable on computers, development of shared curriculum formats, grading packages, etc. will be easily instituted.

Obviously, people need to have computers available to them. Within our group, there is a continuing debate about who should have access to the computers first - the students or the teachers. Some think that computers are so effective as learning tools for students that they should have first crack at them. Others would maintain that an effective teacher will teach well, and that computer-using teachers can become far more effective when given appropriate curriculum development and revision and record keeping tools - i.e. fast computers.

The easiest way to end this particular debate is to ensure that all staff and all students have access to high-quality computer hardware and software whenever needed. Although some people will claim that this is just not economically feasible at the present time, many schools and some entire states have accomplished just that. The real question is - can we afford not to have them available to students and teachers as needed?

# THE ACADEMIC VOCATIONAL INTEGRATION PROJECT AT FCTS

# The Academic Vocational Integration Project at FCTS

## Introduction

Integration is not a new idea. Maybe it should be called re-integration rather than integration. In any case, everyone teaches integration to some extent, and discussions of the ideas of integration did not begin yesterday. In our school, there has been an on-going dialogue concerning concepts of integration for several years. Some of the earlier school-wide integration efforts included the following:

## Early integration efforts:

- **Academic teachers as aides in vocational shops 1976 - present**
  Academic teachers were assigned to vocational shops as aides during free periods. Although instituted primarily for budgetary reasons, some very helpful relationships developed between some academic teachers and the instructors in the assigned shops.

- **Roving SPED aide 1982 - 1985**
  Each special needs teacher was assigned to four shops, and spent about a period a week, every other week in each or these shops, remediating learning problems for students as they arose, or discussing the progress of the SPED students with the shop teacher.

- **Touring the shops 1989**
  In a program designed by vocational teachers, academic teachers spent an in-service 'day' touring the shops in small groups. Vocational teachers gave them overviews of what students actually do in the shops. Everyone seemed to like the contact.

- **Touring the classrooms 1990**
  In a follow-up program, academic teachers explained their programs to small groups of vocational teachers. Some useful dialogue resulted.

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## How the AVIP got started:

In the fall of 1990, Dr. Ron Fitzgerald, at the invitation of our superintendent, David Filkins, gave an in-service presentation at FCTS about learning styles. His presentation included an extensive description of programs which he and his staff have developed at Minuteman RVTHS to tailor teaching techniques to fit the learning styles of vocational students. Inspired by the occasion, Judy Cummings, a Special Needs Teacher, and Ken Rocke, a Carpentry Shop Instructor, approached the administration to ask if a similar effort at FCTS would be supported. After receiving unexpectedly strong encouragement, Judy and Ken began to put together a proposed program, team, schedule, curriculum and budget.

The proposed product, the Academic Vocational Integration Project, was truly the result of teamwork, group brainstorming, and the development of a shared vision of what kind of improved education we might be able to offer our students. Key factors in the development process included:

- Recruitment of team members from each of the major academic areas
- Site visits to Minuteman RVTHS to talk with teachers and administrators involved with similar programs.
- Considerable reading of existing literature, focusing especially on Dr. Norton Grubb's essay and Dr. Charles Benson's testimony regarding integration.
- Attendance at the Integration conference at MVCRC in the spring of 1991
- Consultation with administration at key stages to assess the feasibility of various plans
- Development of a provisional teaching schedule
- Development of possible curricular formats and areas to be covered

The program was approved in modified form in late spring of 1991. Although we were not given everything we had asked for, enough was scheduled so that we felt we could proceed onto the implementation stage with some confidence.

In retrospect, we perhaps settled for too little for fear of getting nothing at all. The program has been functioning for two years with all of the responsibilities that we asked for, but with only some of the additional time which we felt essential to long-term success. It is easy enough to see the reasons why this happened. This has been an extremely difficult time for most schools financially, and our area of the state has been particularly hard hit by the recession. There have been few 'extras' of any kind in the budget, and integration has been seen as desirable, but not crucial to the continued existence of the school.

At any rate, we have been able to test out our ideas concerning integration well enough to speak with some confidence about what could be developed, given adequate resources.

## Key elements of the program:

- All the 10th-grade students from two related shops (Carpentry and Plant Maintenance) are **clustered** together for math and language classes during academic week

- SPED students are **mainstreamed** into these clustered classes, with IEP objectives being fulfilled by a certified SPED teacher who is **team-teaching** with the academic teachers

- The same SPED teacher, our **'SPED liaison'** spends a two periods a day in either of the 'sending' shops when the 10th-graders are in shop;
    - functioning as learning styles consultant
    - remediating learning problems in the shop
    - coordinating shop activities with academic curriculum

- The curriculum of academic classes is **integrated** with the development of shop skills

In this, our third year, we are hoping to at last be able to give our program a full 'test': we are requesting a 'dedicated' curriculum development period for each new integrated course which we are teaching. Also our 10th-grade carpentry shop teacher will also be teaching the 10th-grade carpentry related class. This will enable him to help facilitate the actual integration of curriculum between shop, related, and integrated academic classes.

## Successes

There are a number of 'successes' that have occurred as a result of this program. Some of these successes were not predicted, but have resulted in an educational environment that is better for all.

- We have created a team of teachers who are:
    - no longer feeling isolated
    - sharing techniques
    - sharing expertise
    - co-developing curriculum
    - encouraging one another
- We have created a 'family' of teachers and students.
- We are adapting teaching styles to learning styles.
- We are knitting the day and the 'week-about' time periods together.
- And we are stimulating an interest and dialogue within the school about these issues.

## Problems

There are a number of problems that have been identified as the program has been developed and implemented. A proposed solution is also identified.

- Lack of sufficient planning time
  **solution**: budget planning time for all future programs
- Program is isolated
  **solution**: inform faculty of program, set up new teams
- Academic teachers are not familiar with shop programs
  **solution**: continue training of academic teachers in vocational shops
- Shop teachers are not familiar with academic programs
  **solution**: set up optional academic courses (e.g. computer literacy) and review courses
- Resistance from some staff members
  **solution**: address concerns - create win-win situations
- Bottom-up program development
  **solution**: sell program to whole school, get everyone on board
- No existing curriculum for course taught, with the result that preparation is sometimes difficult, and there is a tendency to return to familiar techniques
  **solution**: design curricular content of courses before beginning and allow plenty of time for revision, curriculum creation, and team discussion

## Where we go from here

In our particular program, our greatest strength is also our greatest weakness; our program has been largely designed, implemented and evaluated by one group of teachers. This has worked well during the pilot stage of our efforts at integration, but considerable additional support is crucial if integration is to be an overall success within our school.

### The next step for the AVIP program - our recommendations

During the next phase of integration, we must have adequate time for:

- our own planning and design of **how to expand**
- at least one full year of AVIP implementation **as we originally conceived it**
- guarantee of adequate time for curriculum development for those new shops and teams 'signing on'

**It would be better to slow the whole process down rather than to ruin it by trying to expand too rapidly.**

The following is a year-by-year description of one possible scenario for program expansion:

### Year one - AVIP consolidates, faculty plans in-service training

**AVIP program spends its time in further development:**

The following integrated courses are currently being taught:

1. Technical math
2. Technical communications
3. Technical science
4. Carpentry related
5. Plant Maintenance related

- Each teacher teaching a new integrated course needs to have a curriculum development period
- Team needs to meet once a week to plan curriculum etc.
- We need to send people on 'gathering' expeditions to other schools
- Academic teachers need more time and experience in the shops.
- Shop teachers need to visit the academic classes a few times.
- The team needs to plan and develop a presentation for the faculty.
- Team needs to form a joint faculty-administration. integration steering committee

**Faculty-administration integration committee designs in-service program for year two**

- Develops goals for a year-long in-service training program
- Surveys staff to determine needs, gather ideas, present plan for feedback
- Does some 'trial' training in small groups to test out plans

**Faculty is kept informed of AVIP 'experiment'**

- AVIP team does presentation at school-wide in service
- Visiting schedule is planned for interested faculty and staff
- One or two in-service presentations around general ideas of integration

**Year two - Faculty spends a year of in-service sessions planning school-wide 10th grade integration of math, communications and science.**

**Volunteer teams spend the year planning the transition to integrated classes:**

- Meet with AVIP team to plan initial development strategies
- Choose academic and special needs teaching 'partners'
- Meet regularly to plan overall curricular approach
- Coordinate where possible with existing Cp-PM project

**Do general staff training around the idea of integration:**

- View teleconferences etc. on integration
- Invite outside speakers from 'integrated' programs

**Hands-on training of non-vocational staff in specific trade skills.**

**Determine appropriate clustering of FCTS shops for an integrated program:**

- What shops could be effectively clustered for an integrated math class? etc.

**Send out teams to visit other programs and report back to the staff as a whole:**

- Visit Lowell and Somerville.
- Visit sending schools. What kind of technology education do they do?
- Visit schools where mainstreaming of SPED students is standard.

**Choose a school-wide curriculum format for related material**

- Computer-based for easy sharing and revision
- Teacher-developed
- Should concentrate first on those tasks which are generic to all shops or all within a cluster

- Should break down job-oriented tasks in a way which makes them accessible to the academic teacher; i.e., easily adaptable to integrated academic classes
- Should facilitate connecting specific trade applications with general academic 'theory'
- Should include sections on safety skills
- Should include sections on employability skills
- Should include section on learning skills

**NOTES**

- Note that in developing an agreed-upon school-wide curriculum format for related material, the question of 'Who is going to teach this?' is often the first to come to a teacher's mind. That is, however, a secondary consideration to 'What is it that our students need to learn?'

- Measuring is the skill which is easiest to look at in this way. In every shop, some measuring skills are essential for success. Measuring skills are covered in both shop and related in every program, and yet students' skills are still less than adequate in most cases. Here, the math teacher is the perfect answer. But - they have to know which skills to teach to which students, how great a degree of accuracy is required, to what level of precision, with what kind of speed.

- Shop teachers should be surveyed through in-service sessions to begin to list all of the measuring skills their students need to develop. We will end up with a huge list of measuring skills. We can then, as a staff, break them down into:
    1. Skills which all students should have
    2. Skills which all students within a cluster should have
    3. Skills which all students in a specific shop should have

- Math teachers must be full partners in the development of this whole idea, or it will be an exercise in futility.

- In a similar way, we can deal with communications skills, science skills, employee skills, safety skills, 'technical' skills, learning skills and business skills.

- At the end of a year, we would have a fully integrated curriculum that everyone could teach from. Because integration is a developmental process, including the entire staff in the development of this would ease the transition into an integrated teaching approach.

**Year three - expansion plans are put into effect**

- Program expands laterally through 10th, to include some or all shops, math and language classes
- Interested teams spend a year of in service training sessions planning a 9th grade integrated curriculum

**Year four - program expands downward to include 9th grade**

## Building efforts: Long-term guidelines and goals

We have had some success employing ideas of integration in classrooms and shops in our AVIP program. AVIP team members have become increasingly enthusiastic about the program. We know that changing teaching methods takes time and energy and is only worth doing if there is a large 'payoff' in improved student learning and motivation. We think that 'integration' has this potential and that it is now time to look closely at where we might go from here.

We have described one possible scenario our school, or one like it, could follow in expanding an existing pilot program into a comprehensive school model. In the following sections, we will present some of our ideas concerning long-term goals that the educational community at FCTS might consider adopting. We are not attempting to present some rigid, mandated schedule or model that we think everyone should bind themselves to. Rather, we are suggesting some ideas and additional models, and welcome any and all thoughts on the subject.

### Shop math program

- The Shop math program (described in detail under Grant Activities) needs to be re-established. This could become part of a comprehensive overhaul of the Exploratory program, or could be implemented immediately to address student needs.

### Exploratory program

- Exploratory students need extensive help in acquiring and reinforcing the basic communications and applied math skills they need to experience initial success in the shops they've chosen to explore. We think our teachers can design, develop and then implement a 9th grade academic program which will integrate academic, technical, and trade knowledge. This would involve the development of a general technology course and would require the shop and academic programs to collaborate in the development of competency profiles which would 'cluster' both academic and technical skills.

### Curriculum Development

- We need to develop a way of coordinating curriculum development between 'related', 'integrated', 'applied', and 'regular' academic classes.
- We need to have a standing committee to review 'integrated' curriculum that is being developed.

### Articulation of Curriculum

- **Articulation of courses within our school.**
  We need to be able to compare what is being taught in one course to what is being taught in another. Although there is some danger in adopting school-wide curriculum formats, i.e., reducing academic 'freedom' and interfering with teacher creativity. We think that it would be more than balanced by the gains to our students. Applied Math provides

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a good example of how one curriculum format can span a lot of coursework which might be taught in a variety of places. Another model-in-development is in the appendices of this manual, and is being experimented with in our AVIP program.

- **Articulation of our courses with community colleges and technical colleges.**
  This is what Tech Prep is accomplishing. This process is, in fact, driving articulation of curriculum within the building as well.

- **Articulation of our courses with those of our sending schools.**
  It would be useful to strengthen connections with our sending schools - to inform them of what we consider to be necessary 'pre-vocational' skills, and also to find out what kind of technical education most of our students are receiving before they come to us.

## Student Evaluation

- Establishing core competencies for all students (life skills)
- Establishing core competencies for each cluster
- Establishing core competencies for each shop
- Moving towards a unified portfolio-based system of student evaluation
- Establishing a system of vocational and academic skills assessment to provide a base-line against which we can measure competency-gain

## New 'Integrated' Courses

### Measuring and basic technical skills

A course for incoming 9th graders covering hands-on measuring skills. A generic core curriculum would cover those measuring skills required of all students (and teachers). A cluster core curriculum would cover those measuring skills essential for success within one of the vocational/technical clusters. A occupationally specific curriculum would introduce students to those measuring skills which will be needed for success within the specific occupation they are most interested in being trained in. Teachers for the course might include vocational teachers, academic teachers, guidance personnel and administrators. In this way the school as a whole would begin to share a common technical language. Ideas of **degree of precision** (how close is close enough?), **degree of facility** (how fast is fast enough?), and **required success rate** (how good is good enough?) would also become common language among the staff.

Students could 'pass out' of the course by demonstrating understanding of:
1) The concept involved (i.e., what is being measured, what is the scale being used, what are the increments of the scale, and what is the system of measurement employed)
2) A basic (or advanced) ability to measure in both modeled and applied situations

Computerized modeling of applied measuring skills could be used to facilitate the kind of drill necessary to master certain measuring operations. Record keeping can be built into the software, as well as assessment and reporting functions. A search should be made for existing math software which could be adapted or applied to voc-tech measuring skills. If none is available, someone should develop such a set of teaching tools through one of the companies which already has appropriate software 'shells' that could be easily adapted.

### Workplace biology

We need a course that will teach students to understand their own bodies through an examination of the occupational hazards they will encounter on the job. Such a course could cut across program boundaries.

For example, a study of chemicals in the workplace that are found in virtually all vocational and technical areas. Perhaps 'the Right-to-Know Laws' along with OSHA regulations could be used as a foundation for such a curriculum.

Such a course could resemble Principles of Technology in its comprehensiveness, and hands-on emphasis, but should have math and language components structured to make it accessible to virtually all students, rather than just those involved with Tech Prep. This course would also share with Principles of Technology its universal applicability. Once developed, it could be adopted, adapted, and implemented all across the country. It could be structured so that it could be used as is, or could serve as a framework for further development.

Again, one could generate a common language throughout the school of both workplace hazards and health, and a fairly comprehensive view of the human body as it interacts within the environment.

A SPED teacher should be included on the development team to ensure comprehensibility of material.

### Materials science

Just as hazards exist in all workplaces, so do materials. Basic physics could be explored through a lab approach to specific materials found in different shops. This course could be seen as an amplification of material covered within the Related classes. Each might cover hazards, laws, measuring, etc. etc. in a way structured to reinforce subject matter introduced in related contexts in other classes.

### Workplace law and history

In a similar way, a course to teach the workings of the legal system, the history of the labor movement (with the social history in which it is embedded), and current laws and regulations governing the workplace would place the students' future work places in a historical context and prepare them for the laws under which they will be working. As a parallel study, laws governing students and student rights might also be looked at. The large-scale re-entry of women into the industrial workplace during W.W.II, for example, would provide both understanding of today's feminist movement and international history of the last 50 years.

Introduction to technology

Technology education needs to be treated similarly to reading, writing and math skills. Since so much of what is covered in the shops is based upon an understanding of basic technology, and since we have no control over students' training in basic technical skills before they come to us, it is crucial that we do the following for incoming 9th grade students:

1) Assess the level of technical skills achievement
2) Provide remediation to a level considered standard for all students
3) Offer further training appropriate to individual clusters during the 9th grade year

Technology training could be similar to what is taught in some 7th and 8th grade technology education courses (which have apparently replaced industrial arts courses in many schools). Hands-on applications of the ideas taught should be stressed.

Computer literacy

Students would benefit from four full years of computer literacy. Basic word processing skills might become the basic skill level expected of most all students. Familiarity with computer-aided drafting, spreadsheet and data-base programs, and desktop publishing software would be expected of students in programs where those tools are standard in industry.

Basic business practices

The students need a course in basic business procedures. This should cover being an effective employee for a company, being self employed, being an informed consumer, etc.

**Staff training**

When someone says that teachers need training, or re-training, there is a tendency to feel a little insulted, as though one has been accused of not being quite competent, of not doing an adequate job. This is a misunderstanding of the kind of training that we are talking about. No one is suggesting that teachers are not fully competent professionals. We are suggesting that the nature of secondary voc-tech education has to change because the world of work has changed. Our training as academic teachers, tradespeople, and vocational-technical teachers no longer fully addresses the learning needs of our students. Our students will be required to learn new technologies on the job, perhaps to change jobs and be re-trained several times in their working careers. Good jobs are requiring more and more sophisticated skills.

Traditional vocational education, although good, is no longer sufficient to meet our student's needs.

If we, as a faculty, can widen our own knowledge and skills and venture across the boundaries separating vocational shops, academic classrooms, and resource rooms, then we can more easily pass that integrated knowledge on to our students. No one is suggesting that English teachers need to know how to weld in order to teach a technical language course to a class of welders. But wouldn't it help if the names of the tools and processes were familiar? Wouldn't it help an 'integrated' math teacher teach those same students if she knew what all the gauges, charts, dials, and measurements the students had to deal with looked like? One of the most frequent comments we heard during our interviews of shop teachers was that many academic teachers did not have much of an idea of what went on in the shops.

One of the most successful in-service training sessions we have had was the one in which academic teachers toured the shops in small groups to hear short presentations from the shop teachers on 'what we teach in this shop'. These sessions were designed in large part by a group of vocational teachers, and the idea was enthusiastically welcomed and implemented by the administration. We think we need to have many more sessions organized around similar ideas, expanding and following-up on the original idea of breaking down some of the boundaries between academic and vocational teachers. It is essential that these sessions be developed by a group of faculty who are representative of the faculty as a whole, and that the entire faculty has an opportunity to have input and give feedback throughout the design process. Teachers are, in general, tired of feeling 'talked-down to' by 'experts' telling them what they have been doing wrong, and promising to fix it all in one afternoon if they would only be 'receptive'. Perhaps the solution to this is to give the responsibility for in-service design to the teachers. However, this will only be effective if the faculty feels that further educating themselves about 'integration' serves their own needs.

**Training academic teachers and others in the shops:**

Some possible strategies to further familiarize academic teachers, SPED teachers, guidance personnel and administration with 'what goes on in the shop.'

Mini-courses in the shops:

Teachers spend time in a specific shop learning certain trade skills.

'Field-trips' to shops:

Teachers take a day away from their own classes to spend a day in a shop, observing and perhaps participating with the students. They could be particularly looking for something they can use in their 'integrated' programs (either existing or in the planning process) - for example, math or language skills.

Core competency portfolios for each shop:

> Shop teachers could identify and list what they feel are the minimum competencies teachers of integrated or applied courses should have in order to properly relate academic material to the actual needs of the shop. Many of these skills would obviously be measuring skills.

It is essential that this process of familiarization be structured as more than a 'one-shot' deal. Teachers come and go, programs change, memories fade. Somehow the connections between shop and classes have to be kept current. Whatever is designed needs to be on-going. For example, 'mini-courses' in the shops could be offered on a rotating basis, so that after a period of years teachers become familiar with a number of shops. Establishing 'levels' of basic expertise that teachers could work toward acquiring is another suggestion.

**Offering academic classes to the faculty**

Computer-literacy courses:

> The faculty as a whole needs to share basic computer-literacy skills. This would greatly expedite the development of school-wide curriculum and record-keeping formats, facilitate the sharing of lesson plans, portfolios and curriculum across shop/class boundaries, and enable all teachers to help all students develop their computer-literacy skills.

**Guidance and special-needs training**

Mainstreaming of SPED students:

> The hidden aspect of our AVIP program is the mainstreaming of SPED students. In some ways, we suspect that this is at least as essential as 'integration' itself. Most of our faculty has little-to-no experience, outside of the AVIP program, as to what mainstreaming is and how best to make it work. Since it is widely implemented in neighboring reform-minded schools, it would be easy for us to send out faculty teams to investigate and report back to the faculty as a whole.

**Statewide efforts**

The new Perkins' legislation and the Massachusetts Department of Education's policies toward the ideas of integration of voc-tech and academic education are very encouraging to those of us 'on the front lines'. Integration in its many forms addresses a variety of student needs. For many of us, it is not until we begin to teach as a member of an integrated team that we realize just how confined and isolated we felt with the 'old' structures of our school and how much better our students learn when all aspects of learning are coordinated.

Those of us involved in integration have plenty of enthusiasm for the new methods. However, we feel we must constantly remind ourselves and others of just how new all of this is to us. This may be 'cutting edge' teaching technology, but it is important to remember that new methods require vast amounts of time for brainstorming, designing, developing and experimenting with a variety of tools, techniques and approaches. It seems, too, like it is impossible to do just one thing at a time. Our program is trying to integrate, cluster, mainstream, team-teach, restructure curriculum, schedules, in-service training and decision-making, and educate ourselves, our peers, our educational community, our students, their parents, and the community. We want to accomplish all of this yesterday at the latest because we feel the urgency of developing programs that work a little better for our students.

Preliminary efforts at developing and implementing integrated programs must be recognized for what they are: **preliminary efforts**. We have been very pleased to be able to participate in the early stages of integration efforts within our state, through our pilot program, our presentation at Fitchburg, and the writing and distributing of this manual. Even though we feel that this manual hardly represents any 'final wisdom' about how to integrate programs, we think that we are onto some good things and hope that we can function as a resource for other programs within our own school, for other schools in our region, and, perhaps, as a model which other schools throughout the state might borrow freely from. We would like to continue in this role, if possible. Even if we don't, we feel that certain statewide policies will continue to facilitate the development of integrated educational programs. We would like to suggest the following:

- Regional 'integrated' centers could be established in voc-tech schools, serving as models for other schools, training sites for teams from other schools, and information dissemination centers.

- The strategy manuals developed by Lowell, Somerville and Franklin County could be revised and updated on an annual basis to incorporate recent findings and methods.

- The establishment of a state-wide electronic bulletin board accessible through the Internet to facilitate the sharing of educational curriculum and techniques by interested schools and programs.

- The development and funding of certain 'integrated' courses which could be created at one school for distribution state-wide.

- Regularly scheduled integration conferences at which on-going collaborations between schools could be facilitated.

# GRANT ACTIVITIES

# Grant Activities

## Introduction

The RFP which initiated this grant specified a dual mission: to **develop pilot programs** which integrate academic and vocational education, **and** outreach activities **to 'spread the word' about successful strategies for integration**. In this section of the manual, we will describe the following various activities carried out under this grant:

**Outreach Activities**

- Presentation at Fitchburg
- Brochure
- Manual
- Collaboration with Lowell and Somerville

**Development within the building**

- AVIP expansion
- AVIP summer training program
- Shop math course
- Career choices curriculum
- Surveys of shops for basic technical skills
- Exploratory portfolios
- Strategies for developing integrated curriculum:

## Outreach activities

### Presentation at Fitchburg

Three members of the AVIP teaching team designed and delivered a presentation about the AVIP program at the Fitchburg professional development conference. We spent a great deal of time developing our presentation because we felt that it was crucial that the greater voc-ed community hear clearly, and in some detail, about a program designed, developed and implemented by a team of teachers. We wanted to be especially clear about the fact that integration works, but that teamwork, teacher input, and sufficient brainstorming and development time are absolute necessities in the development process.

We are including copies of our hand-outs in Appendix Six: Miscellaneous Materials.

### Integration brochure

The brochure on integration, which is being distributed throughout the state, was developed collaboratively between Greater Lowell RVTHS, Somerville High School and Franklin County Technical School. Original conception came from the team at Lowell, and the graphics work was done primarily at Somerville. The overall content was decided upon during a meeting of the three integration teams at FCTS. It is hoped that the brochure will spark people's initial interest in ideas of integration, and will make them aware of statewide efforts now underway.

### Integration strategies manual

This manual was developed by members of the AVIP teaching team at FCTS. We hope that it functions as a resource for ideas and strategies for other teachers and administrators throughout the state who are working to develop more effective programs for their students. We welcome any ideas, responses, or suggestions for improvements in our program. Dialogue among teachers is the key to success, in the building, and in the Commonwealth.

### Collaboration with integration teams at Greater Lowell and Somerville

Integration is a process, not a product. The process of integrating academics and vocational programs with a special needs focus has helped to alleviate a sense of ourselves as isolated teachers within a building. Although teacher's schedules, habits of teaching, and the demands of the teaching day still somewhat remain as barriers to true teamwork, the difference is unmistakable.

Schools can come to feel isolated as well. FCTS sits in the center of the largest geographical technical school district in the state. It takes a long time to get to any other voc-tech school. One of our greatest pleasures in working on this project was our contact with the other integration teams. We truly began to

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feel that we were not alone in our efforts. We look forward to increased connection with our 'sister' schools, and hope to have a number of faculty visit back and forth.

## Development within the building

### AVIP expansion

One of our main goals for this grant was to take a thorough look at what kinds of realistic expansion possibilities we could envision for the AVIP program. We have described a four-year process in some detail in the AVIP section earlier in this manual, and hope that it can serve as a starting point for discussion within our own building. If the faculty is expected to implement integration plans, it must be involved in the design of them.

We hope that our own provisional plans can serve as a starting point for other schools who are looking at the development process of their own integration programs.

### In-service training programs

A variety of strategies for developing in-service training programs around the ideas of integration are covered in both the Guidelines and AVIP sections of this manual. Many of the ideas came during discussions around other issues, during the summer training program, and during surveys of shop teachers. We are confident that further feedback and brainstorming from the faculty during this coming school year will result in many more constructive ideas for in-service sessions.

### AVIP summer training program

The five primary members of the AVIP teaching staff met for afternoon sessions for two weeks during the summer at FCTS.

**How it was structured**

- Four days a week for three hours per session
- All staff paid
- 'Loose' structure: plenty of latitude for general discussions
- Team took turns doing presentations

**Major areas covered**

- Learning styles
- Integrated math curriculum
- Coordinating carpentry and plant maintenance related curricula
- Planning for integrated curriculum development in the coming year
- Writing to listen: note-taking format for all integrated classes and shops
- Analyzing shop tasks for academic (math, science, communications) components

- Preparedness requirements for all students
- Using calculators throughout the AVIP program
- Review the careers choices curriculum
- Discussion of student portfolios
- Integrated communications curriculum
- Discussion of what worked and what didn't in previous two years of AVIP
- Wish list for coming year of program
- Analysis of teaching styles

See Appendix Six: Miscellaneous Materials for a copy of the AVIP Summer Teacher Training survey

**Shop math course**

Shortly after learning that we had been awarded this grant, members of our AVIP team were invited by administration to sit in on the design of curriculum, teaching methods, and recruitment techniques for a special course called **'Shop math'.** The course was to be taught by three teachers, two special needs teachers and one science teacher, and was intended to remediate the basic math and measuring skills which 9th-grade students required for initial success in their chosen shops. The timing of the design was such that all 9th-grade students had chosen their 'full-time' shops, and so it was possible to know just which skills they needed to work on.

We had actually had a very similar course the previous year, taught in several sections by one of our math/computer literacy teachers, but budget cuts had necessitated the elimination of his position. He left behind a computerized measuring program which he had developed in consultation with members of the AVIP team. This program, designed initially to drill students on those measuring skills most needed in the carpentry shop, had been expanded somewhat from its original form to include measuring skills from machine trades and culinary arts. None of the new teachers for the Shop math class had any experience with this particular software. We were able to determine that the computer literacy classroom had free periods that coincided with the scheduled Shop math periods, and so were able to help re-create a program which was sorely missed in the school.

This became an interesting challenge for our program. In our original grant proposal, we discussed the necessity of listing and remediating basic academic/technical skills to 9th-grade students, and the corresponding need to enlist the help of academic and special needs teachers to teach these skills. We called this group of skills 'Basic Technical Skills', and proposed to train some staff members unfamiliar with them well enough so that they could then teach students themselves. The Shop math course became the obvious vehicle for trying out some of our plans.

We 'hired' the Shop math faculty to meet with us after school. We first introduced them to the computer software, and had them train to a level of proficiency adequate to trouble-shoot whatever problems might come up for the students. In addition, we did a few sessions on communicating the concept of fractions on a number line to students who were having trouble understanding it.

The software we used concentrated on perfecting the drill aspect of measuring skills; for a student hired in an entry-level job will not be allowed to move onto skilled tasks if they take too long in measuring. We developed some forms to track student progress and did some experimentation with the idea of students becoming active partners in the evaluation process. These are included in the appendices.

Although we were not able to 'invest' enough hours from the grant to do extensive training of staff in 'basic technical skills', we were able to do enough to feel encouraged about the effectiveness of setting up more comprehensive training and remediation programs. Everyone involved was cooperative and effective in implementing the program. Unfortunately, it appears that it may again be canceled due to budget shortfall.

## Surveys of shops

When we designed our survey for the shops, our intention was to discover, list and then categorize the basic technical skills essential for initial success in the shops. We were looking especially for those skills which shop teachers thought of as 'common sense' (i.e., innately known, rather than learned), and which everyone in the school assumed that someone else was teaching. As we began to carry out the surveys, we soon realized that we could carry out a second objective at the same time. We began to include a number of questions concerning the whole idea of integration.

Most of the surveys were conducted by two AVIP team members with one or two shop teachers (of the same shop). The average length of time was 1-1/2 hours.

### Shop survey results

We surveyed teachers in Electrical, Auto Mechanics (during the summer), Community Services, and Machine Trades. Carpentry and Plant Maintenance, being already included in the AVIP program, had additional input during the summer training sessions. Overall, this included just half of the vocational programs in the building.

We found we had underestimated the time it would take to conduct a survey as comprehensive as the one we had designed. We allowed one and one-half hours of actual survey time per shop - and we quickly realized that one and one-half days would not have been too much time. Not only did people need considerable time to process just what it was we were looking for, but often peripheral but important issues would come up and need some time for discussion. We often heard interesting and creative ideas about how to improve the quality of education in our school, and felt we were tapping a somewhat frustrated but still very concerned reservoir of educational expertise. We frequently felt frustrated ourselves in not having the time to pursue ideas which came up.

We were also surprised to find that although everyone was polite and tried to be as helpful as possible, not everyone agreed with the approach that we were taking. There seemed to be a feeling among some people that the shops were doing as good a job as could be done with the students they were given, and not much would really change that.

After our second interview of this kind, we stepped back and did a little thinking about our approach. We also reviewed a document from Somerville High School, reporting on some of the obstacles they had faced in trying to implement a school-wide integration effort. We realized at this point that we had been telling people, in effect, that what they were doing was not working very well, and that we could tell them how to do it much better. We should not have been surprised at the response.

We redrafted parts of the interview to remedy this, asking instead what they perceived their needs to be. Only then would we ask if they thought some additional help from integrated academic classes would be useful. We also realized that the interview time was an ideal time to find our what they knew about our pilot AVIP program. We also used this time to spread the word a little bit about our successes.

In retrospect, we seemed to have overlooked a few things.

People working on new ideas tend to get very excited about them, and assume that everyone else will feel the same way. We also tend to forget just how much thought and discussion has gone into our point of view - insights about the value of integrated vocational education do not appear overnight, the process is a slow and gradual one, and it is foolish to expect that others will learn any faster than we did. Teachers must be allowed to consider new educational ideas at length, to try them out gradually, and to have choice in the whole matter.

We also assumed that people knew more about our program than they did. And we sometimes found that what they knew about our program was inaccurate. This points out the need for pilot programs to be presented to the staff as a whole, to have them seen as experiments for the benefit of the whole school, not just for a few students and teachers. Although resources may not always be available to allow everyone who wants to experiment, at least everyone can be kept informed of successes and problems, perhaps through in-service programs.

We do not want to over-emphasize the negative. Some shops were very glad to see us, wanted to know what we were doing, how they could be a part of it, and seemed to feel that some new approaches were necessary.

We think the approach taken was not as effective as it might have been, but that the survey still needs to be done in a comprehensive manner. But the audience needs to be larger. One approach might be to begin to list and examine basic math and language and technical skills that are actually used in the shop through a series of on-going in-service workshops. For example, you might structure workshops with a 'theme' - such as using measuring skills in the shop - give teachers adequate time to prepare, and then bring them together to share in a series of short presentations to the group. This could be done either within 'clusters' or on a faculty-wide basis.

This would acquaint the whole staff with the actual uses of measuring tools in the different shops. From this, clusters could meet and decide which skills all students in the cluster should have, and which skills are truly specific to individual shops. The faculty as a whole could then look at the cluster skills, and from them generate a list of 'vocational' skills which all students should possess.

Within any given category (measuring, estimating, drawing etc.) one would then have three different skill levels or lists; generic, cluster-specific, and trade-specific. From such a listing it is one short step to a competency profile, individualized for both cluster and shop.

What is the advantage of doing this? Aren't we already drowning under a sea of unread and unusable curriculum products? The problem with most vocational curriculum is that it is not being developed by the people who are going to use it. The process of developing curriculum is a way of learning it. Most shop teachers have little time to learn new curriculum, unless it is extremely effective, and/or they are paid for doing so.

But it is not shop curriculum that we are trying to look at. It is academic curriculum for vocational students. The common problem here is, again, that students fail to experience the relevance of their academic classes to their vocational shops. Vocational teachers and academic teachers can design academic courses that connect directly to vocational shop tasks, and support and reinforce all of those skills which are ordinarily expected to be covered in related classes. A dialogue between these teachers must be developed. A great deal of time has to be allowed for this. This dialogue needs to be structured with some clear goals in mind, so that everyone knows what they are working toward. But the process itself needs to be directed in large part by the teachers themselves.

If we were to do this survey again, we would distribute it at a group session, explain the rationale behind it, and ask people to spend a few hours responding to it in writing. We would read the results, and follow up with a series of interviews with each shop, clarifying and refining and establishing a dialogue. This would perhaps be a good first step in getting everyone thinking about the same things, and would prepare the ground for later in-service curriculum development activities.

Shop survey questions and forms are included in the Appendices.

## Career choices curriculum

### How is was developed

Members of the AVIP team developed the idea that an ideal time to introduce the concept of integrating academic/vocational to students might be the first few days they come into the school as ninth graders. It was felt that if a curriculum was presented to them in their English classes a few days before they went into their shops for their first look at them, and a few days after this experience, that their choices of shops to explore more closely would be more sound.

The idea of devoting a minimum of *seven* periods of English and asking shop teachers to devote some of the exploratory time to the proposed activities was presented to the administration and the teachers involved. All thought this was an idea worth trying, and three teachers agreed to develop the curriculum as part of this grant during the summer. (see appendix) Shop teachers who were working at the school during the summer were asked for their input during the development of the "Shop Evaluation Form." Almost every shop in the school was consulted, and it is believed that this is one reason the packet was so widely supported by all the shop teachers. Their ideas were listened to and they had input into the development of the form. They owned a piece of it!!!!

**Goals of the curriculum**

There were two types of goals that were established during the development of this curriculum. The first were student centered. We wanted the students to make their shop choices based upon valid criterion. All too often shop choices have been made based on who else is choosing that shop, what their parents have chosen for them, or what they thought they wanted before they came to the school. A number of students stated that the activities they did throughout the course of the curriculum helped them form a decision. We also wanted the students to realize that Franklin County Tech School is all one school. We are not two separate schools (traditional academic and traditional shop) within the same building. We wanted the students to realize that academic teachers are aware of what they are doing while they are in their shops. We wanted the students to realize that the shop teachers supported academic assignments.

The second type of goals was teacher oriented. We wanted to engage as many teachers in this process as possible. This was the first attempt to coordinate an activity that began in an academic class but required time and work involved in the shops. We wanted the English teachers to be aware of this very important decision making process that their students were going through. We were hoping to open communication channels and begin dialogues between the shop and English teachers.

**How it was used**

Incoming ninth graders spent three days (six periods) in their English classes before spending three days exploring all 12 shops in the school. A minimum of four periods would be devoted to looking at career clusters, identifying skills and interests, setting long and short term goals, and becoming familiar with the "Shop Evaluation Form." Each English teacher had been encouraged to modify and expand the curriculum however he wished. The ninth grade student then carried the packet to each of the twelve shops for the next three days. Each shop teacher agreed to devote a few minutes at the end of the exploratory to the filling out of the "Shop Evaluation Form," When the ninth

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graders returned to their English classes, two more periods were devoted to looking at the choices they were going to make. At the end of this, the students ranked all twelve shops from their first choice to their last choice. The actual filling out of the Exploratory Choice Forms was done in each of the English classes.

**Concerns of the curriculum**

Unlike most of the shop teachers, not all of the English teachers were directly involved with the development of the curriculum. Although they all agreed that they would support the development of this curriculum, those who were not directly involved were not as invested when they presented the curriculum to their students. In a follow-up meeting after the curriculum was presented, this issue was raised. Although every one had agreed to present it in their classes, some felt "dumped upon." In the course of discussion it was ***re-discovered*** that those who had a part in the development of the curriculum and thus felt part of it were much more invested its success. Others felt that when they present it next year, they "will make a few modifications that will make it better." (Once these individual modifications are made, then they, too, will own a piece of this curriculum.) It cannot be stated too often or too loud that teachers must be involved in the planning and development of new programs if success of implementation is to be guaranteed.

Appendix: Career Choices curriculum materials

## Exploratory competencies

One way to structure the curriculum for Exploratory might be to decide what it is the students need to know, and in what order, and then to look at how the learning might be organized and structured and prioritized. A kind of flow chart for learning could be established, with pre-vocational skills delivered first, followed by clustered technical skills, and then trade-specific technical skills. After that one could begin to figure out how it might fit into existing teaching schedules and plans.

## Strategies for developing integrated curriculum

The structure of any curriculum reflects the assumptions of those who organized and wrote it. The Applied Math curriculum, for example, is a fairly traditional math curriculum with numerous examples supplied from the world of work. Math, as a subject, is still the most important thing, but the workplace applications are designed to help the student to grasp the basic concept, and then to become skillful at applying it to a variety of real-life situations.

Integrated curriculum developed out of a CBVE performance-based framework produces a product that stresses job related skills. The student needs to be able to do enough math to solve the work-related problem, but whether or not he grasps the concept behind it is, to some extent, secondary. Both kinds of curricular frameworks encourage teaching methods, assessment methods, and curriculum development methods which reflect assumptions about what a student needs to learn.

Which comes first? In a vocational-technical school, the shop training is the most effective 'hook' for the student. Therefore, we begin our task analysis for integrated academic courses by asking - "What does the entry-level worker actually have to do on the job?"

Academic teachers may be a little uncomfortable with a curriculum that is focused in this manner (there are no textbooks we've been able to find which are structured this way), but at least the student always knows the use to which the knowledge will be put. The traditional student question - "What do we need to know this for?" is heard less frequently.

The proposed math curriculum is a good example of this. We began with what a skilled worker has to be able to do with numbers in different situations on the job. When we look closely at what we have listed, the natural questions are: Is this math? Is it related? Is it shop? Is it tech drawing? The answer, of course, is "Yes." Where, when, and how to teach these skills becomes a question of effectiveness and strategy. Having a skill taught in three or four or five places, from different people, all coming at it from slightly different angles helps the student see the relationship between all of these things she is being taught. The theory, the application, and the means to connect the two are suddenly more clear.

Because we are starting with a job related task listing, our integrated math curriculum looks like a Carpentry related curriculum. This is, in fact, what it is. We are isolating the mathematical component of a variety of jobs within the trade, and asking the math teacher to teach directly to those needed skills. These tasks are complex ones. Even reading a linear measure scale on a piece of shop equipment often requires fairly sophisticated de-coding skills. Students must frequently answer crucial questions: What system of measurement is being used? Does the scale begin at zero? How is the scale calibrated? Which increments are marked?

By examining a variety of applications in the student's trade, the math teacher is able to do three things. First, he is continually answering the student's unspoken question, "Why do I need to know this?" Second, he is staying within the student's field of knowledge. Third, he can go from theory to application and back again, on a regular basis, in order to reinforce both abstract and concrete knowledge and skills.

The curriculum being presented here as a potential model is similar in approach to the Math/Science Competencies Project. The orientation is slightly different because we are attempting to describe the ideal related program, taught by a team of math, science, English, and trade teachers, rather than the ideal academic program. The second way our approach differs is that we believe the process of developing an integrated curriculum is itself a necessary step in the training of a teacher who is moving from traditional teaching techniques to a team-taught integrated approach. If the teachers expected to do the teaching are not involved as full partners in the curriculum development, it is likely that they will continue to teach as they have always taught, even if the course is renamed. Assuming that veteran teachers are successful teachers, only the experience of more successful techniques will induce them to change techniques.

Does that mean everyone has to start from scratch, re-inventing the same old wheel over and over again? We don't think so. What can be shared - and passed from program to program and from school to school, is a methodology for developing truly integrated curriculum .

Just as veteran teachers tend to be successful ones, so do schools. School will only change in meaningful ways if they want to. No amount of coercion or exhortation or high-powered in-service presenters will alter the way a school runs and teaches unless powerful reasons to change are presented, learned, implemented on a trial basis, evaluated, and then spread in effective and reasoned ways.

The teachers who benefited most from the development of the CBVE materials and MSCP materials are probably those who were involved in the development process. Few people really learn new teaching techniques by reading about them. Methods to spread effective techniques have to go from teacher to teacher, one by one or in small teams. This kind of bottom-up program development needs considerable resources to be effective. It is a labor-intensive activity, a kind of crafting of one's self, and cannot be done quickly or by formula. Teachers need time to talk to teachers. They perhaps needs some new techniques to respond to the changed teaching environment, and the differing needs of present-day students. They will undoubtedly benefit from support and overall guidance at a school-wide level. Finally, learning is a process which builds upon basics and allows for the differing learning styles of different people. In asking teachers to teach in new ways, we are first of all asking them to be good learners.

Please see Appendix Four: Unified Carpentry Related Curriculum for a rough draft of one model curricular format. This was developed during the summer program, and is still in 'brainstormed' shape - i.e., far from final.

### What does all this mean for a school?

*Top-down or bottom up?* Close cooperation is essential to transform this kind of curricular change from a single pilot program into a school-wide effort at reform. In our case, the initial effort has been conceived and implemented by a team of teachers. In other schools, the initial impetus for change may well come from visionary administrative or guidance personnel. In the first case, our task is to gain help from above. In the second, to find key people and teams which are willing to try out new programs. In both cases, success is dependent upon a shared vision, shared effort, and a good deal of teamwork in setting priorities, developing strategies, and implementing change.

# APPENDICIES

# Appendices

## Appendix One: Basic Technical Skills Shop Survey

**Measuring Up**
**FCTS 1993**
BTS Survey

## Basic Technical Skills Survey

- What skills and specialized trade knowledge unique to your shop should be known by every adult?
  - by every teacher and administrator in the Tech school?
  - by all shop teachers in your cluster?
  - by all SPED teachers?
  - by all math teachers?
  - by all science teachers?
  - by all language arts teachers?
  - by all students entering your program for an exploratory period?
  - by all students choosing your shop on a full-time basis?
- What skills and knowledge unique to your imagined cluster should be known by every adult?
  - by every teacher and administrator in the Tech school?
  - by all shop teachers in your cluster?
  - etc.

**Measuring Up**
**FCTS 1993**
BTS Survey

## The Shop math program

Are your students involved in the Shop math program?

Do you think it is effective?

Do the students seem to like it?

Do you find the lost shop time to be a problem?

What other specific skills would you like to see addressed in the Shop math program?

What do you think of the idea of math etc. skills being developed in this way?

**Measuring Up**
**FCTS 1993**
BTS Survey

## The AVIP program

Are you aware of the AVIP program?

Do you have any questions about it?

Do you think there are some positive ideas? What do you like? What do you dislike?

Would you be interested in becoming involved in a similar program if we can expand?

Do you like the idea of team teaching?

Do you like the idea of shop-oriented academic classes?

Do you think students would learn better?

**Measuring Up**
**FCTS 1993**
BTS Survey

## Clustering of shops during Exploratory

Would you be interested in exploring the idea of having some clusters during the Exploratory program?

If shops were clustered for 9th grade, which shops would you want to be clustered with? Why?

What other shops teach similar skills to what you teach?

What other shops require a similar set of 'prevocational' skills as a prerequisite to success in shop?

Should some safety skills and knowledge be taught to all students? To all students within your cluster?

Should students have to learn the same thing twice? Is there some overlap between what you teach during Exploratory and what some other shops teach?

Would you like to see a unified system of skills record keeping within the school? within your cluster, so as to ensure mastery of skills without unnecessary duplication?

Would you be interested in exploring ways of teaching units between shops in the cluster? (e.g., some electrical theory and practice to carpentry students, and vice versa.)

**Measuring Up**
**FCTS 1993**
BTS Survey

## Pre-vocational skills

What are the essential 'pre-vocational' basic technical skills needed in this shop?

What do you need help teaching, especially at the beginning?

What seems to prevent initial success?

Are you working with anyone in the building to help teach your students those skills?

## Measuring skills

What is being measured?

How do you measure it?

To what degree of precision?

Using what system of measurement?

Reading measurement/conversion tables?

**Measuring Up**
**FCTS 1993**
BTS Survey

## Portfolio-based assessment

Are you familiar with the concept of portfolios?

Do you have an opinion about them?

Do you think they could be used effectively in our school?

**Measuring Up**
**FCTS 1993**
BTS Survey

## In service staff training

Did you like the in service sessions we had a few years ago, where we went around in groups to the different shops and academic classes?

Would you like to see that same idea expanded in some way?

Would you be willing to teach other teachers some of the basic skills of your shop?

Would you have any problems with the idea of testing their abilities (competency-based)?

Would you be interested in learning some new basic shop skills from other shop teachers?

Do you think that in service workshops structured around this framework would be effective?

Do you think real learning could take place in two or three-hour training sessions two weeks apart?

Can you imagine shop teachers taking similar 'classes' from academic teachers? What might be offered?

**Measuring Up**
**FCTS 1993**
BTS Survey

Specialized trade vocabulary

Technical language skills (reading manuals, looking up information)

Graphical language skills?

Computer skills?

Keyboarding skills?

Computerized learning skills?

Planning skills (time and organization skills)?

Technical/scientific concepts?

Math concepts?

Tool identification

Fastener identification, use and sizing

# Appendix Two: Careers Choices Curriculum

Dear Fellow English/ Language and Reading Teachers,

Summer vacation is almost over!!! Hope everyone has had a good one. Enclosed is a copy of the Career Exploratory Curriculum we talked about at the end of school in June. Some of us got together at the beginning of the summer and put this together.

As you review it, please keep in mind that although we ask you to include this in you first two weeks of your English curriculum this year, we will meet to review its success or failures shortly after implementation.

We have met with many, but not all, of the shop teachers this summer, and they have been quite receptive with this process.

Thank you for taking the time to review this material.

AVIP team members,

Judy Cummings
Jill Freitas
Barbara Rubin
Ken Rocke

# Shop
# Exploratory
# Packet

## TEACHERS' GUIDE

**Introductions:** This package has been created to assist our Freshmen students in making decisions about their shop choices. While we are assisting them in making these thoughtful choices, some activities have been created that lend themselves to be presented in your English Class.

Please plan to devote Tuesday, September 7, and Monday and Tuesday, September 13 and 14, to these activities. These activities are designed so that they may be expanded upon if a teacher so desires.

### TUESDAY, SEPTEMBER 7

1. Present the SHOP EXPLORATORY PACKET to the students (the papers bound by plastic folders). Review quotes, if desired.

2. Remind students to place their names on the second page. Explain to them that they will be required to carry these packets with them to the shops when they are in exploratory. They will fill out some pages while they are in their shops. They also must bring these packets with them to English class on September 13.

3. Go over the letter to the parent/guardian with the students. Ask that the parents respond on Tuesday.night.

4. EXPLORATORY VOCABULARY SHEET - This may be used in a variety of ways - This can be group work, class work, or homework.

5. SAMPLE SHOP INFORMATION FORM - This is a larger sample of the form that the students will fill out when they are in the exploratory program. You may use an overhead to present this form to them if you wish. By completing this form before they go into the shops, they will be familiar with this procedure - thus making it easier for them to complete these forms in the shops. We changed the form slightly by asking them to imagine what one of the shops would be like before they have visited it. Ask them to be creative and use their imagination.

6. ACTUAL SHOP INFORMATION FORM - There are 12 forms in this packet. These forms will be filled out by the students as they progress through each of our shops.

7. Remind the students to bring these packets with them to shop on Wednesday - Friday. ALSO remind them to bring these packets with them to English on Monday - September 13. (This is a requirement!!!! This will interfere with the shop selection process if they do not assume this responsibility.)

## MONDAY, SEPTEMBER 13

1. Hand out the next 6 pages to have the students insert into their packet to make up the last half of the packet.

2. Go over the instructions for **THERE'S MORE TO CONSIDER THAN JUST THE WORK!!!** Each teacher may choose how to present this assignment - classwork, homework, individual work. After the first three inventory sheets, the students need to process this information in order to complete **YOUR PERSONAL CHART** and the **CONSIDER YOUR OPTIONS** chart.

## TUESDAY, SEPTEMBER 14

1. Spend any time you feel is necessary to help the students in the decision making process.

2. Hand out the shop selection form and help them complete this form.

3. As soon as every student has completed this form, bring them down to Mike Shepardson so he can begin to enter this information into the computer.

**THESE FORMS MUST BE GIVEN TO MIKIE IMMEDIATELY!!!!!!**

## OPTIONAL LESSON

**ADULT WORKER INTERVIEW** - This could be incorporated at any time during this process. This could be expanded or kept as is, depending upon each teacher's curriculum.

Some of the curriculum activities and ideas were stimulated by looking at the work book titled "**Career Choices** - A Guide for Teens and Young Adults" by Mindy Brigham and Sandy Stryker. Academic Innovations, 3463 State Street, Suite 219A, Santa Barbara, CA 93105, 1993. pages 124 - 141.

Students referred to pages 126, 127, and 128 in the work book titled *"Physical Settings, Working Conditions, and Relationships at Work."*

Most people don't plan to fail

They fail to plan

anonymous

The person who makes no mistakes
does not usually make anything.

Bishop W. C. Magee

The talent of success is nothing
more than doing what you can do well.
and doing well whatever you do.

Henry Wadsworth Longfellow

name

______________________________

# FRANKLIN CO. TECH SCHOOL SHOP EXPLORATORY PACKET

CAREER DECISION MAKING

SEPTEMBER 2 - 14, 1993

## CAREER CLUSTERS*

### CONSTRUCTION

CARPENTRY
ELECTRICAL
PLANT MAINTENANCE
PLUMBING

### SERVICE

COMMUNITY SERVICES
COSMETOLOGY
FOOD TRADES

### MECHANICS

AUTO BODY
AUTO MECHANICS

### PRODUCTION

MACHINES
WELDING/METAL FAB

### TECHNICAL

COMPUTER CLUSTER

*As identified by the **United States Department of Labor**

September 7, 1993

Dear Parent or Guardian,

Welcome to the Franklin County Technical School Community. We are delighted that you and your child have chosen our school.

Now he/she must make **yet** another important decision. After spending three days exploring all 12 shops in the school, your son or daughter will choose three shops. He/she will spend an additional two weeks in each of these three shops, experiencing different aspects of these shop and careers.

As part of the Ninth Grade English Course, we hope to join with you to help guide our students through this decision making process. We are asking them to examine their interests, needs, values, and skills, and to match them to the shops that they explore.

We invite you to write a short response about what you hope your daughter or son will gain from her/his experience in the exploratory program this year.

Sincerely,

English Teacher

(Parent/Guardian response)

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________
signature

# ADULT WORKER INTERVIEW

**Directions:** You are to choose an adult that you feel comfortable with and interview him/her about the work he/she does. Some questions you might ask are:

1. Where do you work?
2. How long have you worked there?
3. Describe the environment where you work. (noise, indoor/outdoor, temperature, odors, activity level, factory, office building, etc.)
3. What skills are required for your job?
4. What are the duties, activities, and responsibilities required of you on this job?
5. Did the job require special training before you were hired?
6. Did the job require additional training after you were hired?
7. What are the **PROS** about working there?
8. What are the **CONS** about working there?
9. Are there opportunities to advance to a higher paying job?
10. What are your satisifactions about working there?
11. Do you work with others or do you work mostly alone?
12. What are some of the benefits?
13. Is there a union where you work? Do you belong? Why or why not?

These are only suggested questions. You may ask other questions if you wish.

You will be required to hand in a written report about this interview.
You may use the following lines to write notes from the interview.

**NAME**____________________

# EXPLORATORY PROGRAM VOCABULARY

Exploratory____________________________________________

____________________________________________

Career clusters____________________________________________

____________________________________________

Short term goals____________________________________________

____________________________________________

Long term goals____________________________________________

____________________________________________

Pros____________________________________________

____________________________________________

Cons____________________________________________

____________________________________________

Values____________________________________________

____________________________________________

Entry level positions____________________________________________

____________________________________________

Options____________________________________________

____________________________________________

Air quality____________________________________________

____________________________________________

Environment____________________________________________

____________________________________________

**Name**____________________

# SAMPLE SHOP FORM

**DIRECTIONS:** Imagine yourself in *one* of the twelve shops here at Franklin County Technical School. What do you think it would be like? Complete the form below as if you had spent a few hours visiting that shop.

**SHOP**______________________________

**1. What do you notice about the environment of the shop?**

Noise level __________________ Air Quality__________________

Temperature__________ Safety Equipment Required________________

Activity level of workers________ Accepted/Required clothing ____________

**2. What work will I be doing if I choose this shop?**

A. During Exploratory________________________________________

B. During 9th grade_________________________________________

C. During 10th grade________________________________________

D. During 11th grade________________________________________

E. During 12th grade________________________________________

**3. What career options would be available when I finish this shop program?**

A. Entry level____________________________________________

B. Intermediate position_____________________________________

C. Top of the trade/career___________________________________

**SHOP**________________________

**1. What do you notice about the environment of the shop?**

Noise level ____________________ Air Quality ____________________

Temperature __________ Safety Equipment Required ____________________

Activity level of workers ________ Accepted/Required clothing ______________

**2. What work will I be doing if I choose this shop?**

A. During Exploratory ______________________________

B. During 9th grade ______________________________

C. During 10th grade ______________________________

D. During 11th grade ______________________________

E. During 12th grade ______________________________

**3. What career options would be available when I finish this shop program?**

A. Entry level ______________________________

B. Intermediate position ______________________________

C. Top of the trade/career ______________________________

---

**SHOP**________________________

**1. What do you notice about the environment of the shop?**

Noise level ____________________ Air Quality ____________________

Temperature __________ Safety Equipment Required ____________________

Activity level of workers ________ Accepted/Required clothing ______________

**2. What work will I be doing if I choose this shop?**

A. During Exploratory ______________________________

B. During 9th grade ______________________________

C. During 10th grade ______________________________

D. During 11th grade ______________________________

E. During 12th grade ______________________________

**3. What career options would be available when I finish this shop program?**

A. Entry level ______________________________

B. Intermediate position ______________________________

C. Top of the trade/career ______________________________

NAME______________________

# THERE'S MORE TO CONSIDER THAN JUST THE WORK!!!

Before you make a decision about your exploratory selections, it is important to think about the general characteristics you favor in a job. On each of the following three pages, you will find a brief description of a particular category of career considerations. A list of options involving that category follows. Check the box in front of any statement that appeals to you. Choose as many options as you like, but make sure thay don't contradict each other. Feel free to add to the lists if we've overlooked something that appeals to you.

After completing the first three pages, answer the questions you find in **Your Personal Chart.** Using this information about yourself, begin to consider your options for shop choices. Fill out the chart titled **Consider Your Options!!!**

# YOUR PERSONAL CHART

**Directions:** You probably checked a number of statements in each category. Read them all again to get a *very* broad picture of your career desires. Since it's unlikely that any shop or job could meet all these requirements, go back and choose the one or two statements from each category that mean the most to you. Circle the boxes in front of those statements. Then enter them on the following chart. Keep these in mind as you begin to make shop and career choices.

**The physical setting I want to work in is:**____________________

________________________________________________________

**The working conditions I would most enjoy include:**__________

________________________________________________________

**I would like my work relationships to be:**____________________

________________________________________________________

**The skills I have or would most like to acquire include:**_______

________________________________________________________

________________________________________________________

________________________________________________________

# CONSIDER YOUR OPTIONS!!!

**Directions:** You have looked at all the shops here at the school. Now you must select the shops you are most interested in. Complete the following chart to help you clarify your options.

| SHOP | PROS | CONS | REASONS I WILL SUCCEED HERE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

## Appendix Three: Shop math Materials

## SOLVING MATH PROBLEMS IN THE SHOP

FCTS
School year _______
Student # _________
Student ___________

## SHOPMATH ON THE COMPUTER

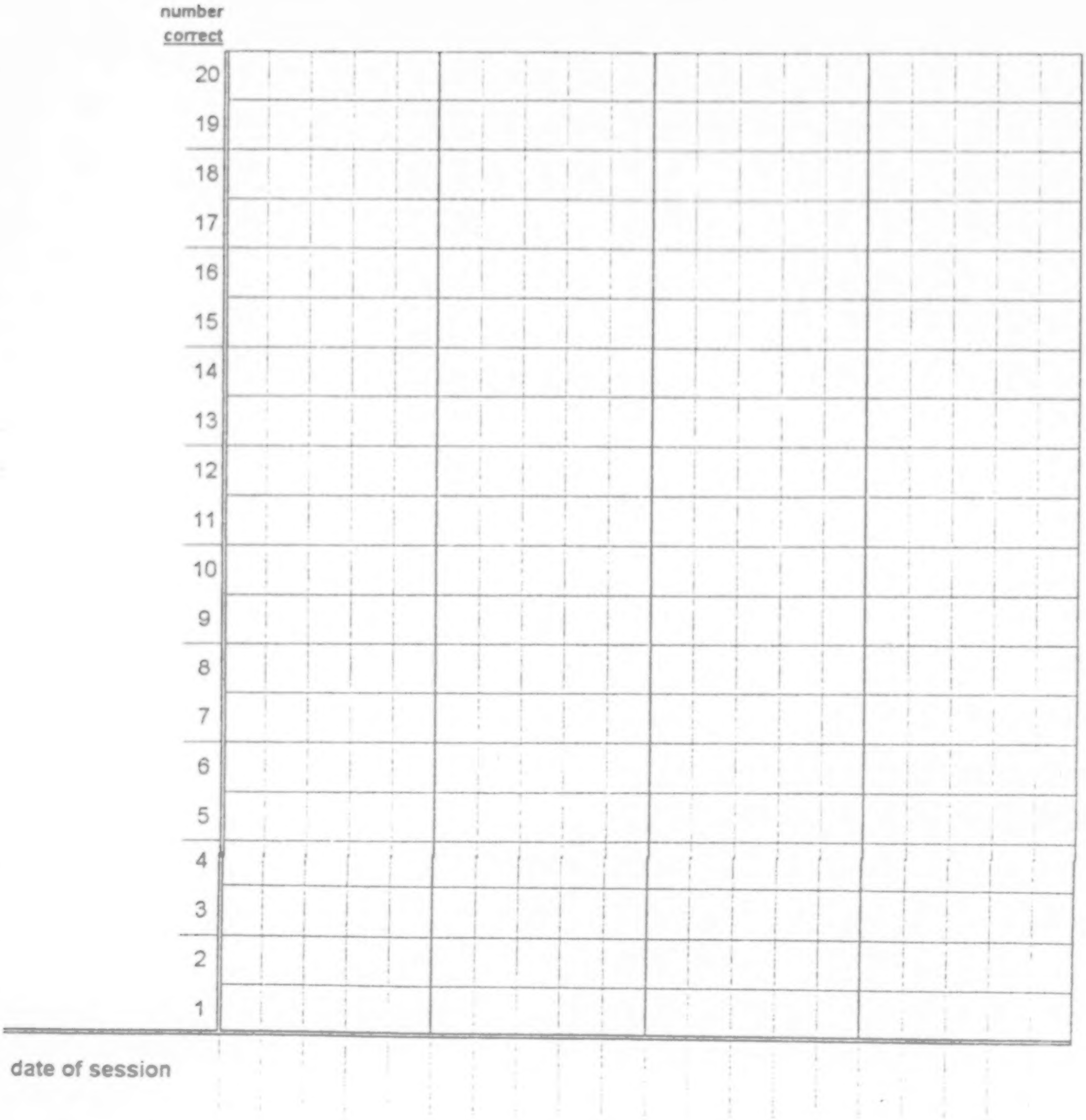
| Basic | Intermediate (X) | Advanced (Y) | | | |
|---|---|---|---|---|---|
| ☐ **READING THE RULER** | | | | | |
| ☐ | ☐ | ☐ | 1/4's of an inch | x = | y = |
| ☐ | ☐ | ☐ | 1/8's of an inch | x = | y = |
| ☐ | ☐ | ☐ | 1/4's and 1/8's mixed | x = | y = |
| ☐ | ☐ | ☐ | 1/16's of an inch | x = 10 | y = 3 |
| ☐ | ☐ | ☐ | 1/2's thru 1/16's mixed | x = 10 | y = 3 |
| ☐ **CHANGING FEET AND INCHES** | | | | | |
| ☐ | ☐ | ☐ | changing inches to feet-and-inches | x = | y = |
| ☐ | ☐ | ☐ | changing feet-and-inches to inches | x = | y = |
| ☐ | ☐ | ☐ | mixed problems from a) and b) above | x = | y = |
| ☐ | ☐ | ☐ | convert fractions to decimals | x = | y = |
| ☐ | ☐ | ☐ | multiplication by twelves | x = | y = |
| ☐ **DOING RULER ARITHMATIC** | | | | | |
| ☐ | ☐ | ☐ | add fractions | x = | y = |
| ☐ | ☐ | ☐ | subtract fractions | x = | y = |
| ☐ | ☐ | ☐ | add lengths | x = | y = |
| ☐ | ☐ | ☐ | subtract lengths | x = | y = |
| ☐ | ☐ | ☐ | find half of a length | x = | y = |
| ☐ | ☐ | ☐ | find fraction equivalent of a decimal | x = | y = |

BASIC: 20 in a row correct
INTERMEDIATE: 20 correct in x minutes
ADVANCED; 20 correct in y minutes

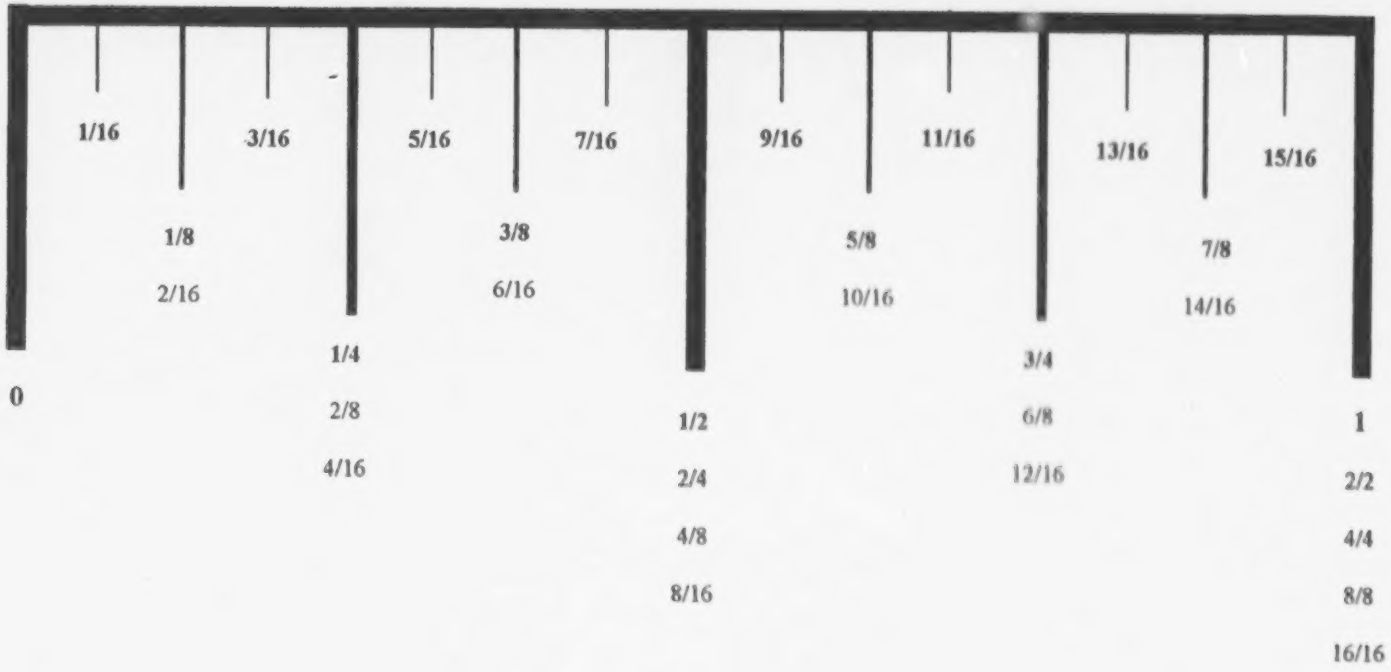
**Skill: Reading the ruler - up to 1/16's of an inch**
**Goal: 20 correct, in a row**

Student ______________
Shop ______________

Progress chart



# READING THE RULER


1/16
3/16
5/16
7/16
9/16
11/16
13/16
15/16
1/8
2/16
3/8
6/16
5/8
10/16
7/8
14/16
0
1/4
2/8
4/16
1/2
2/4
4/8
8/16
3/4
6/8
12/16
1
2/2
4/4
8/8
16/16

# Appendix Four: Unified Carpentry Related Curriculum

| | |
|---|---|
| JOB I. | MEASURING |
| JOB II. | ESTIMATING |
| JOB III. | LAYING-OUT |
| JOB IV. | CALCULATING |
| JOB V. | PROBLEM-SOLVING |
| JOB VI. | INTERPRETING DATA |
| JOB VII. | SKETCHING AND DRAWING |
| JOB VIII. | READING DRAWINGS |
| JOB IX. | WORKING WITH MODELS |
| JOB X. | WORKING WITH PHYSICAL AND CHEMICAL PROPERTIES OF MATERIALS |
| JOB XI. | APPLYING PRINCIPLES OF ENERGY, FORCE AND MOTION |
| JOB XII. | APPLYING PRINCIPLES OF HEAT |
| JOB XIII. | APPLYING PRINCIPLES OF MAGNETISM AND ELECTRICITY |
| JOB XIV. | APPLYING PRINCIPLES OF WAVE MOTION, LIGHT AND SOUND |
| JOB XV. | DEVELOPING EMPLOYABILITY SKILLS |
| JOB XVI. | DEVELOPING COMPUTER LITERACY SKILLS |
| JOB XVII. | DEVELOPING BUSINESS SKILLS |
| JOB XVIII. | COMMUNICATING ON THE JOB |
| JOB XIX. | READING FOR TECHNICAL INFORMATION |
| JOB XX. | SOLVING PROBLEMS ON THE JOB |
| JOB XXI. | DEVELOPING LEARNING SKILLS |
| JOB XXII. | MAKING CAREER CHOICES |
| JOB XXIII. | EXPLORING THE TRADE |
| JOB XXIV. | USING FASTENERS |

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## O (SKILL)

### JOB I. MEASURING

A. GETTING READY TO MEASURE
B. READING THE RULER LINE
C. READING THE ARCHITECTS' SCALE
C. SCALING DRAWINGS
D. READING THE FRAMING SQUARE
E. MEASURING STOCK (thickness, width and length)
F. READING LINEAR MEASURE SCALES ON TOOLS AND MACHINES
G. MEASURING DISTANCES ON MACHINES
H. COMMUNICATING MEASUREMENTS
I. READING THE PROTRACTOR
J. READING ANGLE SCALES ON TOOLS AND MACHINES
K. READING DIALS AND GAUGES
L. MEASURING FASTENERS
M. MEASURING TIME
N. MEASURING LIQUIDS AND DRY MEASURE
O. MEASURING TEMPERATURE

### JOB II. ESTIMATING

B. UNDERSTANDING CONCEPTS OF ESTIMATING
A. GETTING READY TO ESTIMATE
C. MAKING COMMON-SENSE ESTIMATES (ball-park estimates)
D. USING ESTIMATES BEFORE CALCULATING WHEN SOLVING PROBLEMS
E. MAKING ROUGH ESTIMATES WITHOUT PENCIL-AND-PAPER ('mental math')
F. ESTIMATING FRACTIONAL PARTS
G. ESTIMATING TIME FOR A JOB
H. ESTIMATING MATERIALS FOR A JOB
I. ESTIMATING COST OF A JOB
J. ESTIMATING DISTANCES
K. ESTIMATING AREA
L. ESTIMATING VOLUME
M. ESTIMATING WEIGHT OF MATERIALS
N. ESTIMATING STRENGTH OF MATERIALS
O. ESTIMATING DEGREES OF ANGLES
P. ESTIMATING PROPORTIONS OF LIQUIDS AND DRY MEASURE
Q. ESTIMATING DOLLAR VALUE OF A JOB (MEANS)

### JOB III. LAYING-OUT

A. UNDERSTANDING SPATIAL RELATIONSHIPS: lines, planes and solids
D. VISUALIZING IN TWO AND THREE DIMENSIONS
D. CONSTRUCTING GEOMETRIC FIGURES USING DRAFTING TOOLS
E. UNDERSTANDING THE LANGUAGE OF LAYOUT IN THE TRADES
F. LAYING-OUT SIMPLE LINES AND SHAPES USING CARPENTRY LAYOUT TOOLS
G. CHECKING LAYOUT USING GEOMETRY AND MATH
H. USING LAYOUT TECHNIQUES IN THE SHOP
I. USING LAYOUT TECHNIQUES IN BUILDING HOUSES

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JOB IV. CALCULATING

A. USING A CALCULATOR TO SOLVE PROBLEMS
B. WORKING WITH FRACTIONS
B. CONVERTING NUMBERS
D. COUNTING BY GROUPS

JOB V. PROBLEM-SOLVING

A. USING FORMULAS TO SOLVE PROBLEMS
B. USING RULES OF THUMB TO SOLVE PROBLEMS
C. CONVERTING PROBLEMS TO WORD PROBLEMS TO MATH PROBLEMS
D. USING ALGEBRA TO SOLVE PROBLEMS

JOB VI. INTERPRETING DATA

A. READING CHARTS
B. READING GRAPHS
C. READING SPREADSHEETS
D. READING A STOCK LIST

JOB VII. SKETCHING AND DRAWING

A. USING ROUGH SKETCHES TO COMMUNICATE PLANS, IDEAS AND LAYOUT
B. TRANSLATING IDEAS INTO DRAWINGS INTO PLANS INTO REALITY
C. PLOT DRAWINGS ONTO GRAPH PAPER
C. DRAWING ON THE COMPUTER

JOB VIII. READING DRAWINGS

A. READING SHOP DRAWINGS
B. READING PARTS DIAGRAMS
C. READING BLUEPRINTS FOR HOUSE CONSTRUCTION
D. READING MAPS

JOB IX. WORKING WITH MODELS

A. BUILDING FULL-SCALE MODELS OF BUILDING DETAILS
B. BUILDING SCALE MODELS OF HOUSES

JOB X. WORKING WITH PHYSICAL, CHEMICAL AND BIOLOGICAL PROPERTIES OF MATERIALS

A. WORKING WITH WOOD AND WOOD PRODUCTS
B. WORKING WITH METALS
C. WORKING WITH PLASTICS
D. WORKING WITH CONCRETE AND CEMENTITIOUS PRODUCTS
E. WORKING WITH CHEMICALS USED ON THE JOB
F. WORKING WITH FLUIDS
G. WORKING WITH BIOLOGICAL MATERIALS

JOB XI. APPLYING PRINCIPLES OF ENERGY, FORCE AND MOTION

JOB XII. APPLYING PRINCIPLES OF HEAT

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JOB XIII. APPLYING PRINCIPLES OF ELECTRICITY AND MAGNETISM

JOB XIV. APPLYING PRINCIPLES OF WAVE MOTION, LIGHT AND SOUND

JOB XV. DEVELOPING EMPLOYABILITY SKILLS

JOB XVI. DEVELOPING COMPUTER LITERACY SKILLS

JOB XVII. DEVELOPING BUSINESS SKILLS

A. EXPLORING COMPUTER-BASED BUSINESS PROGRAMS

JOB XVIII. COMMUNICATING ON THE JOB

A. USING TRADE VOCABULARY
C. DEVELOPING COMMUNICATION SKILLS
D. USING COMMUNICATION SKILLS ON THE JOB
E. TALKING WITH CUSTOMERS
F. WORKING AS A MEMBER OF A TEAM

JOB XIX. READING FOR TECHNICAL INFORMATION

A. READING AND FOLLOWING WRITTEN DIRECTIONS
D. WRITING INSTRUCTIONS
B. LOCATING RESOURCES
C. LOCATING TECHNICAL INFORMATION
D. UNDERSTANDING SAFETY WARNINGS
E. UNDERSTANDING LABELS

JOB XX. SOLVING PROBLEMS ON THE JOB

A. MAKING DECISIONS
B. ANALYZING TECHNICAL PROBLEMS
C. UNDERSTANDING CONSEQUENCES

JOB XXI. DEVELOPING LEARNING SKILLS

A. USING COMPUTER PROGRAMS TO REMEDIATE BASIC MATH SKILLS
B. USING A WORD PROCESSING PROGRAM

JOB XXII. MAKING CAREER CHOICES

JOB XXIII. EXPLORING THE TRADE

A. TALK TO PEOPLE IN THE TRADE
B. VISIT PLACES WHERE CARPENTERS AND CABINETMAKERS WORK
C. VISIT LOCAL HISTORIC HOUSES
D. READ A BOOK ABOUT BUILDING A HOUSE

JOB XXIV. USING FASTENERS

A. CLASSIFY FASTENERS ACCORDING TO USE
B. SIZE FASTENERS FOR SPECIFIC APPLICATIONS
C. LIST STEPS FOR USING DIFFERENT KINDS OF FASTENERS

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O (SKILL) 00 (task)

## JOB I. MEASURING

A. **GETTING READY TO MEASURE**
1. determine what needs to be measured
2. determine required degree of precision
3. choose the best measuring tool

B. **READING THE RULER LINE**
1. read the ruler line to quarters of an inch
2. read the ruler line to eights of an inch
3. read the ruler line to sixteenths of an inch

C. **READING THE ARCHITECTS' SCALE**

C. **SCALING DRAWINGS**
1. determine the scale of a given drawing or blueprint
2. take measurements from a scaled drawing or print using an architects' scale
3. take measurements from a scaled drawing (1/4" = 1') using a common tape measure

D. **READING THE FRAMING SQUARE**
1. locate the 10th's scale
2. locate the 12th's scale

E. **MEASURING STOCK** (thickness, width and length)
1. with a tape measure
2. with a stick rule
3. with a slide caliper
4. with a dial caliper

F. **READING LINEAR MEASURE SCALES ON TOOLS AND MACHINES**
1. read the depth-of-cut scale on the Delta jointer to the nearest 1/32"
2. read the depth-of-cut scale on the Makita jointer to the nearest 1/32"
3. read the table height indicator scale on the Delta planer to the nearest 1/16"
4. read the table height indicator scale on the Makita planer to the nearest 1/16"
5. read the depth-of-cut indicator on the Makita planer to the nearest 1/32"

G. **MEASURING DISTANCES ON MACHINES**
1. measure between the blade and the fence on a tablesaw to the nearest 1/16"
2. measure the effective depth-of-cut of a straight cutter in a router
3. measure the height of the blade on a tablesaw to the nearest 1/16"

H. **COMMUNICATING MEASUREMENTS**
1. recording measurements on a stock list
2. reading a stock list

I. **READING THE PROTRACTOR**
1. read the protractor to the nearest degree

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**J. READING ANGLE SCALES ON TOOLS AND MACHINES**

1. read the scale on a miter box to the nearest degree
2. read the tilting scale on a table saw to the nearest 5 degrees
3. read the angle scale on a jointer to the nearest five degrees
4. read the scale on a protractor-saw guide to the nearest degree
5. read the scale on the tilt adjustment on a portable circular saw to the nearest 5 degrees

**K. READING DIALS AND GAUGES**

1. read the air pressure gauge on the air hoses to the nearest 5 lbs.
2. read the manometer on the air filters to the nearest ____

**L. MEASURING FASTENERS**

1. determine the diameter, pitch and length of a variet;y of machine screws
2. determine the size and length of a variety of wood screws

**M. MEASURING TIME**

1. read analogue clock
2. read digital clock

**N. MEASURING LIQUIDS AND DRY MEASURE**

**O. MEASURING TEMPERATURE**

## JOB II. ESTIMATING

**A. UNDERSTANDING CONCEPTS OF ESTIMATING**

1. understanding the concept of orders of magnitude
2. understanding the concept of degrees of precision
3. understanding the concepts of limits and parameters

**B. GETTING READY TO ESTIMATE**

1. determine what is to be estimated
2. determine precision required
3. choose best technique

**C. MAKING COMMON-SENSE ESTIMATES (ball-park estimates)**

**D. USING ESTIMATES BEFORE CALCULATING WHEN SOLVING PROBLEMS**

**E. MAKING ROUGH ESTIMATES WITHOUT PENCIL-AND-PAPER ('mental math')**

**F. ESTIMATING FRACTIONAL PARTS**

**G. ESTIMATING TIME FOR A JOB**

**H. ESTIMATING MATERIALS FOR A JOB**

**I. ESTIMATING COST OF A JOB**

**J. ESTIMATING DISTANCES**

1. by eye
2. by comparing to size of known objects (counting ceiling tiles etc.)

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K. **ESTIMATING AREA**

L. **ESTIMATING VOLUME**

M. **ESTIMATING WEIGHT OF MATERIALS**

N. **ESTIMATING STRENGTH OF MATERIALS**

O. **ESTIMATING DEGREES OF ANGLES**

P. **ESTIMATING PROPORTIONS OF LIQUIDS AND DRY MEASURE**

Q. **ESTIMATING DOLLAR VALUE OF A JOB (MEANS)**

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## JOB III. LAYING-OUT

### A. UNDERSTANDING SPATIAL RELATIONSHIPS: lines, planes and solids

1. demonstrate understanding of the concept of straightness
2. demonstrate understanding of the concept of parallel lines and planes
3. accurately describe horizontal and vertical lines and planes
4. describe perpendicular planes
5. demonstrate understanding of length, area, and volume
6. accurately describe flatness of planes
7. demonstrate understanding of the concept of 'square'
8. define thickness, width and length (of stock)
9. define length,height, width and depth (of rooms, walls, closets, furniture)

### D. VISUALIZING IN TWO AND THREE DIMENSIONS

1. identify right triangles, acute triangles, isosceles triangles
2. identify squares. parallelograms
3. identify 45's and 90's

### D. CONSTRUCTING GEOMETRIC FIGURES USING DRAFTING TOOLS

1. construct parallel lines
2. construct perpendicular lines
3. draw circles of given diameters with a compass
4. draw circles of given radii with a compass
5. draw a line tangent to a circle
6. draw a line bisecting a circle
7. bisect an angle with a compass
8. construct right triangles of given height and base
9. construct an isosceles triangle
10. draw an acute angle
11. draw an obtuse angle
12. construct a square
13. construct a parallelogram
14. draw and label roof cross-sections of common pitches (3/12, 4/12, 6/12, 8/12, 9/12, 12/12.

### E. UNDERSTANDING THE LANGUAGE OF LAYOUT IN THE TRADES

1. center-to-center measurements
2. outside-to-outside, inside-to-inside, inside-to-outside measurements
3. long-to-long, short-to-short, and long-to-short

### F. LAYING-OUT SIMPLE LINES AND SHAPES USING CARPENTRY LAYOUT TOOLS

1. square a line across a board with a combination square
2. square a line across a board with a framing square
3. draw a straight line between two points
4. scribe a line parallel to an edge using a combination square
5. lay-out a 45-degree miter on the face of a board
6. lay-out a 45-degree bevel on the edge of a board
7. given two angles, lay-out a compound miter
8. given an angle (in degrees), lay it out using a protractor saw guide
9. given an angle (as a ratio), lay it out using a framing square
10. transfer a given angle with a bevel square
11. transfer a given angle with a protractor-saw guide
12. transfer a given angle with a rule and straightedge
13. divide a length into a given number of equal parts using a set of dividers

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14. lay-out a circle of a given diameter over 10" using a string and pencil
15. find the center of a board (width)
16. find the center of a board (length)
17. find the center of a board (thickness)
18. lay-out a chamfer around a board

G. **CHECKING LAYOUT USING GEOMETRY AND MATH**
1. check a small frame for square using a framing square
2. square a frame by checking the diagonals
3. square a large frame or wall with the 3-4-5 method

H. **USING LAYOUT TECHNIQUES IN THE SHOP**
1. working from a story-stick, lay-out a faceframe for kitchen cabinets
2. lay-out shelf locations for a medicine cabinet
3. lay-out fastener positions for a sheetrock stool
4. lay-out locations of dadoes and rabbets for a sheetrock stool
5. lay-out compound-miter cuts for sawhorse legs
6. lay-out compound-miter mortices in sawhorse top
7. lay-out miter crosscuts for sawhorse strut

I. **USING LAYOUT TECHNIQUES IN BUILDING HOUSES**
1. lay-out a stud wall with 16" on-center framing
2. lay-out a stud wall with 24" o.c. framing
3. lay-out a window opening
4. lay-out a door opening
5. lay-out a story-pole for rough framing the walls of a house
6. lay-out a stair stringer
7. lay-out a common rafter
8. lay-out a hip rafter
9. make a full size template for plumbing fixture cut-outs
10. scribe a board or panel to an irregularly-shaped surface

## JOB IV. CALCULATING

A, **USING A CALCULATOR TO SOLVE PROBLEMS**

B. **WORKING WITH FRACTIONS**
1. add and subtract fractions (up to 16th's)

C. **CONVERTING NUMBERS**
1. changes inches to feet-and-inches
2. change feet-and-inches to inches
3. change common carpentry fractions to their decimal equivalents using a chart
4. find fractional equivalents of common decimals for carpentry

D. **COUNTING BY GROUPS**
1. count by 12's to 120
2. count by 16's to 96
3. count by 24's to 96
4. count by 1/2's to ten
5. count by 1/4's to five
6. count by 1/8's to two
7. count by 1/16's to one

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## JOB V. PROBLEM-SOLVING

### A. USING FORMULAS TO SOLVE PROBLEMS

1. compute the area of a rectangle
2. compute the area of a right triangle
3. compute the volume of a rectangular solid
4. compute the area of a circle, given the diameter
5. compute the circumference of a circle, given the diameter
6. given the radius, figure the diameter
7. write the formulas for figuring area of squares, rectangles, and right triangles
8. write the formulas for figuring volume of rectangular solids
9. given an angle (in degrees), figure its complement

### B. USING RULES OF THUMB TO SOLVE PROBLEMS

### C. CONVERTING PROBLEMS TO WORD PROBLEMS TO MATH PROBLEMS

### D. USING ALGEBRA TO SOLVE PROBLEMS

## JOB VI. INTERPRETING DATA

### A. READING CHARTS

### B. READING GRAPHS

### C. READING SPREADSHEETS

### D. READING A STOCK LIST

## JOB VIII. SKETCHING AND DRAWING

### A. USING ROUGH SKETCHES TO COMMUNICATE PLANS, IDEAS AND LAYOUT

1. sketch a wall to show window and door locations
2. sketch a shop project well enough to discuss materials and feasability
3. sketch design ideas for a simple construction project (shed)
4. sketch a gable-end piece of plywood to show orientation before laying it out

### B. TRANSLATING IDEAS INTO DRAWINGS INTO PLANS INTO REALITY

1. do a three-view drawing of a simple shop project (toolbox?)
2. generate a complete cutting list working from same
3. list steps and procedures necessary to complete project

### C. PLOT DRAWINGS ONTO GRAPH PAPER

1. plot an existing foundation

### C. DRAWING ON THE COMPUTER

1. draw and dimension a box on Autosketch

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JOB VIII. READING DRAWINGS

A. **READING SHOP DRAWINGS**
   1. make up a cutting list working from shop drawings

B. **READING PARTS DIAGRAMS**
   1. compare parts diagram to tool to determine if they are the same
   2. locate correct diagram for a given model
   3. given a broken part, locate it on diagram and record part # and reference #
   4. assemble a piece of equipment, given parts diagram and instructions

C. **READING BLUEPRINTS FOR HOUSE CONSTRUCTION**
   1. determine the overall dimensions for a house from plans
   2. determine the dimensions of a room from plans
   3. locate windows and doors on a wall from plans

D. **READING MAPS**

JOB IX. WORKING WITH MODELS

A. **BUILDING FULL-SCALE MODELS OF BUILDING DETAILS**

B. **BUILDING SCALE MODELS OF HOUSES**

JOB X. WORKING WITH PHYSICAL, CHEMICAL AND BIOLOGICAL PROPERTIES OF MATERIALS

A. **WORKING WITH WOOD AND WOOD PRODUCTS**

B. **WORKING WITH METALS**

C. **WORKING WITH PLASTICS**

D. **WORKING WITH CONCRETE AND CEMENTITIOUS PRODUCTS**

E. **WORKING WITH CHEMICALS USED ON THE JOB**
   1. classify chemical substances according to pH factor
   2. classify chemical substances according to type of use
   3. identify chemical hazards in the shop
   4. list appropriate precautions for working with specific hazardous chemicals
   5. list appropriate emergency procedures for specific chemical injuries

F. **WORKING WITH FLUIDS**

G. **WORKING WITH BIOLOGICAL MATERIALS**
   1. list appropriate precautions for dealing with bloody injuries in the shop

JOB XI. APPLYING PRINCIPLES OF ENERGY, FORCE AND MOTION

JOB XII. APPLYING PRINCIPLES OF HEAT

JOB XIII. APPLYING PRINCIPLES OF ELECTRICITY AND MAGNETISM

JOB XIV. APPLYING PRINCIPLES OF WAVE MOTION, LIGHT AND SOUND

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## JOB XV. DEVELOPING EMPLOYABILITY SKILLS

### A. FINDING A JOB

1. writing a resume'
2. writing a job application letter
3. filling out a job application
4. communicating in a job interview
5. looking for work through newspaper ads
6. looking for work through employment agencies

### B. HOLDING ONTO A JOB

1. show understanding of importance of being at work every day, on time
2. show understanding of importance of teamwork on the job
3. demonstrate safe behavior on the job

## JOB XVI. DEVELOPING COMPUTER LITERACY SKILLS

## JOB XVII. DEVELOPING BUSINESS SKILLS

### A. EXPLORING COMPUTER-BASED BUSINESS PROGRAMS

1. use a building cost estimating program
2. enter data into a spreadsheet/cutting list for cabinets
3. draw up a simple project using Autosketch (computer-aided drafting)

## JOB XVIII. COMMUNICATING ON THE JOB

### A. USING TRADE VOCABULARY

1. name tools
2. name techniques

### C. DEVELOPING COMMUNICATION SKILLS

1. given a series of oral instructions, list them in the proper order
2. given confusing oral instructions, ask relevant questions to clarify the order
3. listen attentively for key information
4. take notes when necessary to reinforce information given
5. write down a verbal materials order: double check it with the boss

### D. USING COMMUNICATION SKILLS ON THE JOB

1. make a phone call to a retail outlet to check prices on materials
2. record an accurate message from a business phone call
3. fill out necessary forms correctly

### E. TALKING WITH CUSTOMERS

### F. WORKING AS A MEMBER OF A TEAM

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## JOB XIX. READING FOR TECHNICAL INFORMATION

### A. READING AND FOLLOWING WRITTEN DIRECTIONS

1. read the label on a paint can: list the steps
2. read an instruction manual for a tool: service it
3. read a 'how-to' article about a simple shop project: build it

### B. WRITING INSTRUCTIONS

1. leave a note explaining the next step in a project
2. list the steps necessary to complete a task
3. list the safety factors for a given shop procedure

### C. LOCATING RESOURCES

1. make up a tool order from a catalogue
2. find a supplier of a specific material through the yellow pages
3. call several tool catalogue companies: have catalogues sent out

### D. LOCATING TECHNICAL INFORMATION

1. find information about a carpentry procedure in a textbook
2. locate articles about a building problem in building magazines
3. find a rafter span table in a carpentry text
4. find a specific project in a woodworking magazine

### E. UNDERSTANDING SAFETY WARNINGS

1. list specific dangers of specific products
2. analyze situations for potential hazards

### F. UNDERSTANDING LABELS

1. decode fastener packaging
2. read lumber stamps

## JOB XX. SOLVING PROBLEMS ON THE JOB

### A. MAKING DECISIONS

1. given job scenarios, decide what to do

### B. ANALYZING TECHNICAL PROBLEMS

1. given a picture frame which is out of square, find the cause of the problem
2. analyze a swinging door
3. find the cause of a door which sticks

### C. UNDERSTANDING CONSEQUENCES

1. list ways not to do something, giving the specific consequences

## JOB XXI. DEVELOPING LEARNING SKILLS

### A. USING COMPUTER PROGRAMS TO REMEDIATE BASIC MATH SKILLS

### B. USING A WORD PROCESSING PROGRAM

1. write up shop notes
2. write up communications assignments on the computer

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## JOB XXII. MAKING CAREER CHOICES

## JOB XXIII. EXPLORING THE TRADE

A. **TALK TO PEOPLE IN THE TRADE**

B. **VISIT PLACES WHERE CARPENTERS AND CABINETMAKERS WORK**

C. **VISIT LOCAL HISTORIC HOUSES**

D. **READ A BOOK ABOUT BUILDING A HOUSE**

## JOB XXIV. USING FASTENERS

A. **CLASSIFY FASTENERS ACCORDING TO USE**

1. correctly identify wood screws
2. correctly identify machine screws
3. correctly identify fasteners for concrete and block
4. correctly identify fasteners for sheetrock
5. correctly identify various kinds of nails
6. identify kinds of coatings on fasteners and explain their purpose
7. identify different kinds of fasteners according type of material they are made from

B. **SIZE FASTENERS FOR SPECIFIC APPLICATIONS**

1. list rules of thumb for selecting sizes of various fasteners
2. write down fastener sizes
3. read and understand fastener descriptions on packaging and stock lists

C. **LIST STEPS FOR USING DIFFERENT KINDS OF FASTENERS**

1. list steps to drive nails in framing lumber
2. list steps to drive nails in hardwood
3. list steps to fasten wood screws into softwood and hardwood
4. list steps to use lag shields and lag bolts in concrete or block walls
5. list steps to drill and tap a hole in mild steel
6. list steps to use a through-bolt in any material
7. list steps to countersink and plug a screw-hole in wood
8. list steps to select correct drill bit for pilot holes in softwood and hardwood
9. list steps to select right size drill bit for clearance holes

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# Appendix Five: MVCRC List of Integration Resources

# Integration Bibliography

| Call No | Title | Date |
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| 001.64<br>MASS | MSCP Vocational Technical Applications of Physical Science Concepts: Computer<br>Mass Dept of Ed/Division of Occupational Education | 1991 |
| 027.8<br>Winn | Integration of the Secondary School Library Media Center into the Curriculum:<br>Libraries Unlimited, Inc. | 1991 |
| 370.113<br>Beck | General Education: Vocational and Academic Collaboration<br>NCRVE | 1991 |
| 370.113<br>Beck | An Uncommon Education<br>NCRVE | 1991 |
| 370.113<br>NCRVE | Improving the Basic Skills of Voc-Tech Students: an Administrative Guide<br>NCRVE/AAVIM | 1986 |
| 370.113<br>NCRVE | Integration of Academic & Voc-Tech Ed: an Administrative Guide<br>NCRVE/AAVIM | 1987 |
| 370.113<br>NCRVE | Proceedings for Forum on Integrating Occupational and Academic Education<br>NCRVE | 1989 |
| 375.02<br>Bottoms | Integrating Academics with Vocational Education<br>Gene Bottoms | 1991 |
| 375.02<br>Daly | Counselor Role and Educational Change: Planning, Integration, and Basic Skills: Bk 3<br>Ft. Collins, CO: Colorado State University/US Department of Education | 1992 |
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| 375.02<br>Fogarty | The Mindful School: How to Integrate the Curricula<br>Skylight Publishing, Inc. | 1991 |
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| 375.02<br>Grubb | The Cunning Hand, the Cultured Mind: Models for Integrating Vocational and<br>NCRVE | 1991 |
| 375.02<br>Illinois | Identification of Generalizible Skills in Secondary Vocational Programs<br>Illinois State Board of Education | 1983 |
| 375.02<br>Illinois | Setting the Stage: a Practitioner's Guide to Integrating Vocational and Academic<br>Illinois State Board of Education/Adult Vocational & Technical Education | 1991 |
| 375.02<br>Illinois | Generalizable Reasoning Skills: Resource Directory<br>Illinois State Board of Education | 1987 |
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| 375.02<br>Maine | Integrated Studies<br>Portland Regional Vocational Technical Center, Portland, Maine | 1988 |
| 375.02<br>Maine | Integrated Studies<br>Porland Regional Vocational Technical Center Portland, Maine | 1988 |
| 375.02<br>NCRVE | Laying the Foundation for Integration. an NCRVE Teleconference Video<br>NCRVE | 1992 |
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| 375.02<br>PACVE | Integrating Academic and Vocational Skills Instruction a Video Resource<br>Pennsylvania | 1991 |
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| 375.02<br>Rhode Island | Interdisciplinary Curriculum<br>Rhode Island Department of Education/Davies Voc-Tech High School | 1990 |
| 375.02<br>Schmidt | What Works When Teachers Integrate Vocational & Academic Education<br>NCRVE | 1992 |
| 375.02<br>South Carolina | Reinforcing Basic Skills Through Vocational Education<br>South Carolina Department of Education | 1987 |
| 375.02<br>SREB | Making High Schools Work Through Integration of Academic and Vocational<br>Southern Regional Education Board | 1992 |
| 375.02<br>VAP | Integrating Academic and Vocational Education: A Video Resource (conference tape)<br>VAP Foundation | 1992 |
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| 500<br>MASS | Math & Science Competencies: Voc. Applications of Physical Science Concepts:<br>Mass Department of Education/Division of Occupational Education | 1990 |
| 500<br>New York | Occupationally Related Science.<br>University of the State of New York/State Department of Education | 1986 |
| 510<br>MASS | MSCP Vocational Technical Applications of Mathematics Concepts/Learning Guide<br>Mass Department of Education/Division of Occupational Education | 1991 |
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| 610.73069<br>New Jersey | New Jersey Occupational Competency List for Licensed Practical Nurse<br>Occupational Competencies Project/NCCC/ New Jersey | 1992 |
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| 621.4<br>V-TECS | V-TECS Product Elements for : Small Engine Repair<br>V-TECS/Mississippi | 1991 |
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| 647.94<br>MASS | MSCP Vocational Technical Applications of Physical Science Concepts: Hotel &<br>Mass Department of Education/Division of Occupational Education | 1991 |
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| 649<br>New Jersey | New Jersey Occupational Competency List for Child Care Attendant<br>Occupational Competencies Project/NCCC/ New Jersey | 1991 |
| 651.3<br>New Jersey | New Jersey Occupational Competency List for Receptionist<br>Occupational Competencies Project/NCCC/ New Jersey | 1992 |
| 651.37<br>New Jersey | New Jersey Occupational Competency List for General Office Clerk<br>Occupational Competencies Project/NCCC/ New Jersey | 1992 |
| 651.3741<br>New Jersey | Com-Link with Basic Skills and Academic Linkages: Medical Office Receptionis/Asst<br>New Jersey State Department of Education/Ocean County | |
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|---|---|---|
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# Appendix Six: Miscellaneous Materials

**Franklin County Technical School**
**Industrial Boulevard**
**Turners Falls, MA 01276**

August 17, 1993

Dear Parent or Guardian,

Your son/daughter is presently enrolled in the AVIP Plant Maintenance Shop Program at Franklin County Technical School. We believe that in order to properly prepare our students for future employment, we must require that they develop responsible work habits.

This letter is to inform you that one of the primary work habits that we will address is being prepared for instruction and work. In school, being prepared means bringing the following tools to class or shop **at all times!!**

| **SHOP** | **MATH, ENGLISH, RELATED** |
|---|---|
| Pencil, 3 Ring Binder Notebook | Pencil |
| Calculator (TI Math Explorer) | 3 Ring Binder Notebook |
| Tape Measure, Belt | Calculator (TI Math Explorer) |
| Safety Glasses | Tape Measure |
| Boots | Text Book |

It is the responsibility of the student and you as parent/guardian to provide the boots, safety glasses, belt, and pencils.

Franklin County Technical School will provide one 3 ring binder notebook and all required text books. The student and you as parent/guardian are responsible for replacement for any lost, damaged, or misplaced items.

The Texas Instruments Math Explorer Calculator will be purchased by the school and resold to the student at half price. The student cost will be less than $10.00. The tape measure may be purchased by the student or you, however the school will offer a tape measure at half price. The student cost will be about $5.00.

Thank you for your support and cooperation. We all agree that developing these good habits early will provide the opportunity for your child to be more successful in school this year and in the work place in the future. We look forward to working with and teaching your child this year.

Sincerely,

| | | | |
|---|---|---|---|
| Judy Cummings | Jill Freitas | Rick Lane | Guy Lapollo |
| Special Needs Instructor | English Teacher | Math Teacher | Shop Teacher |

## AVIP CURRICULUM - ENGLISH - 1991 - 1992

I. Sentence structure

II. Paragraph form
    A. Main idea
    B. Parts of a paragraph

III. Punctuation
    A. Quotation marks
    B. Commas
    C. Capitalization
IV. Short story
    A. Parts of a short story
        a. Character development
        b. Setting
        c. Theme
        d. Problem
        e. Solution
        f. Climax

    B. Composing a short story
        a. Character description
        b. Setting description
        c. Identifying the theme
        d. Identifying the problem
        e. Working towards the solution
        f. Climax
        g. Conclusion

V. Writing assignment -
    A. "My life 5 years from now"
    B."My life 20 years from now"
VI. Job Unit
    A. Applying for a job
        1. Application
        2. Want ads
        3. Cover letter
        4. Interview
        5. Vocabulary

    B. Starting a small business

- C. Employability skills (vocabulary activities included in each unit)

    - 1. Behavior on the job
    - 2. Dealing with the boss (applied communication)
        - a. Making requests
            - i. information
            - ii. action
            - iii. permission
        - b. Responding to requests
            - i. in writing
            - ii. verbal
    - 3. Job safety
        - a. Employee behavior
        - b. Employer responsibilities
            - i. OSHA
            - ii. Child labor laws

    - 4. Materials - tools needed to work as a carpenter or in plant maintainence
    - 5. Shop vocabulary - words frequently used in shop - idea was to create a trade dictionary

VII. Reading and following warning labels
- A. Cement
- B. Stanley Tape Measure
- C. Lynsol Paint Thinner

VIII. Writing warning labels

IX. Book Reports

X. Independent reading folder - read a novel and complete the various activities

- A. Design cover
- B. Read book
- C. Vocabulary - identify 20 new words
- D. Title page
- E. Fact sheet (Name, Author, Setting, Character description, summary, climax, opinion, what did you learn?)
- F. Activity sheets

XI. Instructional Shop Manuals

## AVIP Summer Teacher Training survey

If you were going to set up a similar training program for teachers in an integrated program, what would you do the same? What would you change?

What kinds of things did you learn about learning styles and teaching styles?

Do you see ways you might change your methods of presentation?

What do you think are the strengths and weaknesses of developing integrated curriculum in a team?

Would you be willing to help design an expanded teacher training program to implement an integration project?

What did you find most valuable in the sessions?

Is there anything which you would definitely change next time around?

# ACADEMIC
# VOCATIONAL
# INTEGRATION
# PROJECT

## FRANKLIN COUNTY TECHNICAL SCHOOL

**Rural Communities**

**19 towns** - economically depressed, farming, logging, small business, independent contractors

**2 larger towns**- fading paper and machine industries, growing plastics, high/tech, and communication industries

**Large geographical area**

**450 students**
40% SPED population

**12 shops - "Week about"**

## A.V. I. P. PROGRAM

1. Clustered:
    - 10th grade Carpentry and Plant Maintenance
    - Math and English
2. Mainstream *all* SPED students
3. Team teaching
4. Integrated Curriculum
5. SPED liaison position
    - becomes familiar with basic shop skills and procedures
    - coordinates integrated curriculum
    - acts as learning styles consultant to shop and academic team
    - identifies and remediates learning barriers as they arise

## SUCCESSES

1. Created a team of teachers:
    - no longer feeling isolated
    - sharing techniques
    - sharing expertise
    - co-developing curriculum
    - feeding off each other's enthusiasm and successes
    - checking each other's negativity
    - re-invigorating teachers
2. Created a family of students and teachers.

## SUCCESSES

3. Developing an accurate analysis of student learning styles and teacher teaching styles.
4. Adapting teaching styles to students' learning styles.
5. "Re-education" of Academic and Vocational staff by SPED liaison.
6. Knitting the day and the "week about" time periods together.
7. Stimulating an interest within the school around these ideas

## OBSTACLES

- Lack of sufficient planning time!!!!!!!
- Program is isolated
- Academic teachers not familiar with shop program
- Shop teachers not familiar with academic program
- Resistance from some staff members
- "Bottom-up" program development

## PROGRAM DEVELOPMENT PROCESS

1. Shared vision
2. Inspired by Dr. Ron Fitzgerald speaking to the F.C.T.S. faculty
3. Requested and received support from administration
4. Brainstorming
5. Visited other integrated programs
6. "Nuts and bolts" planning
7. Submitted a complete A.V.I.P. program, including:
    - curriculum outlines for integrated academic courses in science, math, English, drafting, computer literacy, and social studies
    - team staffing

## GRANT ACTIVITIES

1. Developing new integrated courses.
2. Cross-training of A.V.I.P. staff.
3. Developing integration strategies manual.
4. Developing program expansion strategies for F.C.T.S.
5. Further developing of current integrated curriculum in English, math, and related courses.

## NEW COURSES FOR 9th GRADE

MEASURING COURSE

- Offered during shop, 1 to 3 periods a week
- Taught by SPED or Math teachers
- Communication between shop and academic teachers

CAREER EDUCATION

- First school-wide "integrated" curriculum
- Presented in *all* English classes
- Offered *before* students make shop choices

## PLANS FOR NEW COURSES

Develop overviews for the following courses:

- Workplace Law and History
  - OSHA
  - Child Labor Laws
  - Fair Labor Practices
  - Equity Laws
  - Labor Movement
- Workplace Science
  - Chemistry
  - Biology
  - Materials and Machines
- History of Technology

## WHAT WORKS

- Team teaching
- Mainstreaming of SPED students *with* SPED liaison
- Authentic integration
- Freedom to experiment
- Shared vision between teachers

# Appendix Seven: NCRVE Products Catalogue